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ABSTRACT

This report is one of eight concerning third-grade students to be issued in connection with the North Carolina statewide assessment project. The assessment of mathematics achievement is based on a sample of 5,000 third-grade students, 2,500 using the Iowa Tests of Basic Skills (ITBS), and 2,500 using state developed objective-based tests (SCORE). Data were analyzed statewide and on the basis of several socioeconomic factors. On the average North Carolina third-grade students scored several months below the national average on the ITBS. The areas in which these students tended to score below the national average were the U. S. monetary system, modern mathematics concepts, complex computational problems, and fractions. Students did perform adequately on SCORE. Appendices to this report provide tables describing the relationships of ITBS scores with socioeconomic variables, analysis of scores as a function of subtests, teacher ratings of SCORE objectives, and several analyses for SCORE items. (SD)

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GRADE I

MATHEMATICS

STATE ASSESSMENT OF EDUCATIONAL PROGRESS IN NORTH CAROLINA, 1973-74

DIVISION OF RESEARCH / NORTH CAROLINA DEPARTMENT OF PUBLIC INSTRUCTION / RALEIGH 27611

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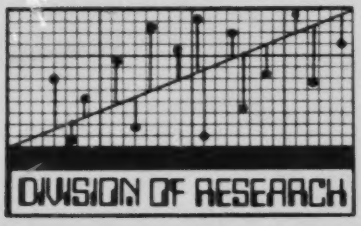
GRADE 3 MATHEMATICS



STATE ASSESSMENT OF EDUCATIONAL PROGRESS IN NORTH CAROLINA, 1973-74

DIVISION OF RESEARCH / NORTH CAROLINA DEPARTMENT OF PUBLIC INSTRUCTION / RALEIGH 27611

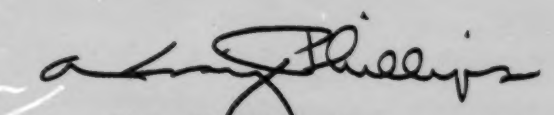
November, 1974

FOREWORD

As one of the ways to improve the quality of public education in the State, personnel in the State Department of Public Instruction conduct an annual assessment of educational performance. This assessment provides educational decision makers with accurate and objective information for planning and administering the State's public elementary and secondary schools.

This year, a series of reports will be released on the performance of third-grade students. The reports will include reading, mathematics, language arts, social studies, science, cultural arts, health, and physical education. Also, special surveys on teachers' and principals' opinions of education will be released. All of this information should also help the general public to be better informed about the status of their schools on a statewide basis.

Aware of the fact that patrons and educators at the local school level also wish to know more about the quality of education in their schools, the State Department of Public Instruction is initiating a program to assist local school personnel to conduct assessment programs. Constructive use of this information, as well as statewide data, will insure continuing progress in providing appropriate learning experiences for all children and youth in North Carolina.



State Superintendent
of Public Instruction

ACKNOWLEDGMENTS

In any major comprehensive effort such as the current Statewide Assessment of Education, it is impossible to recognize all individuals and groups who have made significant contributions. It is appropriate, however, to recognize a number of groups and agencies that have provided major services in this effort.

Were it not for the support of the members of the State Board of Education, funds and other resources would not have been allocated for the assessment program. The leadership provided by members of the Board is especially appreciated.

Special acknowledgments go to the personnel in the local school systems who cooperated and assisted with the assessment effort. The superintendents, the support staff, the principals, and the teachers proved to be accommodating and professionally dedicated in every respect. Their assistance was invaluable.

The Research Triangle Institute should be highly commended for assistance provided in several technical areas of the assessment.

The staff members from the Divisions of Reading, Language Arts, Mathematics, Science, Cultural Arts, Social Studies, and Health and Physical Education were vitally involved in the selection and development of tests for the assessment. Without their efforts, the comprehensiveness of the assessment would have been severely limited.

Finally, special appreciation is expressed to staff members in the Division of Research who successfully coordinated and completed this major assignment in a most efficient manner.

Wm. J. Brown Jr.

Director of The
Division of Research
Department of Public Instruction

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Assistant Superintendent for
Research and Development
Department of Public Instruction

PREFACE

As part of his total effort to initiate better management techniques, the State Superintendent of Public Instruction indicated in 1970 that more and better information was needed for state-level planning. He initiated the State Assessment of Educational Progress in response to that need.

The assessment program was a collaborative effort from the beginning. Many levels of the education community contributed suggestions. Funds and services for the program were obtained from local, state, and federal sources. Cooperation among local and state components of the public school system and the nationally respected Research Triangle Institute was the backbone of the assessment. There was an open exchange of ideas, experiences, and services.

As a result of these cooperative relationships, the first State Assessment of Educational Progress took place in the spring of 1972 with minimal disruption to school programs. A statewide sample of sixth graders participated by completing exercises in reading, mathematics, language arts, career awareness, and several dimensions of student attitudes.

At the recommendation of the State Board of Education, the 1973 Legislature voted to fund the assessment program annually as part of the budget of the State Superintendent of Public Instruction. Concurrently, an advisory committee of legislators, businessmen, students, parents, and educators was formed to assist the State Board and the State Department of Public Instruction on aspects of statewide assessment and accountability.

A three-year cycle of assessment in grades three, six, and nine was established, beginning in 1974 with the State Assessment at the third grade. In the 1974 assessment, information was collected from teachers and principals as well as students. Student performance measures were taken in language arts, mathematics, cultural arts, reading, science, social studies, health, and physical education. Reports are now being prepared on the results.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
Purpose of the Assessment	1
Implementation of the Assessment	2
The Sample	2
Field Procedures	3
Assessment Areas	3
Types of Instruments	4
Interpreting Test Scores	6
Norm-Referenced Tests	6
Objective-Based Tests	9
Making Valid Comparisons of Test Scores in North Carolina	11
Characteristics of the National Norm Group	11
North Carolina Comparisons With Other States	15
Comparisons Within North Carolina	17
HIGHLIGHTS OF MATH ASSESSMENT RESULTS	21
MATHEMATICS ACHIEVEMENT	23
Summary of Principals' and Teachers' Perceptions of Their Mathematics Programs	23
Description of ITBS and SCORE Mathematics Tests	25
ITBS Mathematics Results	26
Comparison of State and National Averages	26
ITBS Subgroup Results	28
Summary of ITBS Subgroup Results	29
ITBS Diagnostic Results	30
SCORE Test Results	31
Objective Cluster One	32
Objective Cluster Two	32
Objective Cluster Three	33
Objective Cluster Four	33
Objective Cluster Five	34
Summary of SCORE Results	34

Page

Conclusion..... 35

APPENDICES

Appendix A

Math Total and Subtest Average Grade Equivalent Scores for North Carolina and Various Classification Variables..... 41

ITBS Total Math Score Distribution for North Carolina and the Nation..... 42

Average Scores and Ranges by Classification Variables:
For ITBS Math Total Score..... 43
For ITBS Math Problems Test..... 44
For ITBS Math Concepts Test..... 45

National vs. State Averages on the ITBS Math Subtests and Total..... 46

Mountains vs. State Averages on the ITBS Math Subtests and Total..... 47

Peidmont vs. State Averages on the ITBS Math Subtests and Total..... 48

Coastal Plains vs. State Averages on the ITBS Math Subtests and Total..... 49

Averages in ITBS Math Total According to Parent's Education Level..... 50

Averages on ITBS Math Problems Subtest According to Parent's Education Level..... 51

Averages on ITBS Math Concepts Subtest According to Parent's Education Level..... 52

Averages on ITBS Math Total According to Family Income..... 53

Averages on ITBS Math Problems Subtest According to Family Income..... 54

Averages on ITBS Math Concepts Subtest According to Family Income..... 55

Appendix B

State and National Item Percentage Correct Profile
For Math Problems Subtest..... 59
For Math Concepts Subtest..... 60

Appendix C

Group Data for Teachers' Rating of Mathematics Assessment Objectives for Score Math Test.....63-73

Group Data for Teachers' Rating of Objective-Item Congruence and Item Difficulty for Score Math Test.....75-82

Page

Summary Data for Teacher Math Objective Questionnaires and Percentage of Student Correct Responses by Objectives.....83-85

Score Math Objective Clusters..... 86

Appendix D

Introduction to Item Cluster Analysis Tables.....89-90

Percentage of Students Correctly Responding to Various Numbers of Items Within Each Objective on Math Test.....91-98

Percent of N. C. Students Responding Correctly to Items on Objective-Based Math Test.....90-100

INTRODUCTION

Purpose of the Assessment

In order to improve educational planning and decision-making in North Carolina, the State Department of Public Instruction initiated a statewide assessment of educational progress. The information gathered through this assessment operation has three basic purposes:

1) To examine the state's present educational position: Knowing the educational status will enable educators to plan better programs for improving learning and teaching. Objective information will help decision-makers set program priorities with more assurance and allocate resources on the basis of need. An accurate description of the current status will increase general public knowledge and understanding about the public schools.

2) To measure educational progress over a period of years: As time passes, a charting of the educational progress in this state can be made. These benchmarks of educational quality could become the basis for educational accountability for the state.

3) To seek means of improving North Carolina's education: As more information is collected in the state assessments, variables which affect learning can be examined, and those variables which show a positive influence on learning can be promoted.

In addition, the state assessment effort provides local units with technical assistance in planning similar local programs which aid the setting of local priorities. Goals may be set using meaningful state and regional norms which are made available from the statewide effort. Furthermore, assessment information collected in each school will assist teachers in planning better instructional programs for public school youngsters and help patrons and parents to better understand the educational needs and attainments of North Carolina children.

In a continuing attempt to develop and improve North Carolina's assessment program, the Legislature, adding its encouragement through program support, approved funds in 1973 as a part of the State Superintendent's program budget to underwrite the statewide assessment effort. This State Assessment at the third-grade level is the first stage in a proposed three-year assessment cycle. In 1974-75, assessment will occur in the sixth grade, and, in 1975-76, at the ninth-grade level.

Implementation of the Assessment

The Sample

Selecting third graders to participate in the assessment program was the responsibility of the Research Triangle Institute, assisted by the State Department of Public Instruction. The objective was to choose a representative sample of size sufficient to provide reliable estimates of test score averages for the State, the Coastal Plains, the Piedmont, and the Mountains. Independent samples of 2500 students were considered appropriate for each of the five areas described in the section entitled "Assessment Areas". The total third grade enrollment of the eighteen schools containing 1970-71 state-supported kindergartens provided approximately 2,000 students for a special assessment follow-up.

A two-stage sampling procedure was designed to select the 12,500 students for the first five areas. In order to give each third grade student in North Carolina an equal chance of being chosen, 618 schools were randomly selected with the probability of school selection based upon stratification according to the size of the third-grade enrollment.

Random selection of students within schools was controlled to preserve the proportion of ESEA Title I enrollment within the third-grade class.

Of the 93,752 third-grade students in North Carolina, the chance of selection for any child was ten out of seventy-four.

Field Procedures

An Assessment Coordinator was designated by the superintendent of each participating LEA to organize all assessment activities. The activities included: (1) selecting and coordinating the testing schedule, (2) distributing and collecting test packages and questionnaires, and (3) providing information and assistance to the test administrators and principals. With the approval of the superintendent, Assessment Coordinators also selected someone other than the student's classroom teacher to administer the tests. These administrators read aloud all items which did not test the student's ability to read. To insure standardization of test procedures, the Division of Research staff held workshops to acquaint coordinators and administrators with assessment procedures.

Assessment Areas

The 1973-74 Assessment of Third Graders consisted of five different assessment areas and an additional research package for the evaluation of third graders who had previously attended state-supported kindergarten. In addition to student measures, all teachers (grades K-6) and principals of the 618 schools included in the student sample were asked to respond to questionnaires designed to reflect their opinions about the educational needs and priorities in North Carolina.

The subjects included in the six assessment areas and the type of testing involved are listed in Table 1.

TABLE 1

OVERVIEW OF 1973-74 ASSESSMENT AREAS, TESTING, AND SAMPLING

Assessment Area	Type of Testing	Number of Students Sampled
Reading, Math, Language Arts	Norm Referenced (Iowa Tests of Basic Skills)	2,500
Reading, Math, Language Arts	Objective Based	2,500
Health and Physical Education	Objective Based Motor Performance	2,500
Cultural Arts	Perception Survey	2,500
Science and Social Studies	Objective Based	2,500
Third-Grade Kindergarten Follow-up	Norm Referenced (Iowa Tests of Basic Skills (Cognitive Abilities Test) (Self Observation Scale)	2,000

Types of Instruments

Reading, Language Arts, and Math were each assessed by both a norm-referenced test (Iowa Tests of Basic Skills) and an objective based test developed at the state level. The difference in the kinds of information provided by the two types of measurements should be considered when interpreting test results.

Nationally standardized achievement tests, such as the Iowa Tests of Basic Skills, are designed to provide information about student performance in given subject areas in relation to the performance of other students who are representative of the nation as a whole. The national sample of students taking the ITBS is the "norm" or reference group to whose performance we compare our state results. Thus, the ITBS provides information on the educational status of North Carolina third-grade students in relation

to the performance of a national sample of "typical" third graders. Such standardized tests also assume a continuum of achievement skills based upon the scores of the national sample. North Carolina's third-grade results may be considered against this continuum.

Norm-referenced tests are designed to spread out developmental scores on a continuum of skills spanning several grade levels. However, they do not tell us specifically what our students have achieved or how they perform on a given set of educational tasks. Some items on the ITBS can admittedly be grouped into subject area objectives, but the test is not designed for diagnostic purposes.

Therefore, objective-based tests were developed for the areas of reading, language arts, and mathematics in order to assess more specific knowledge of North Carolina's students. Program area specialists and researchers collaborated on this review and selection process. Questionnaires were developed, information gathered, standardized tests carefully reviewed, and objectives and items finally selected in accord with some of the major educational goals of North Carolina.

Objective-based tests, also known as criterion-referenced tests, are developed differently from norm-referenced tests. They facilitate assessing the extent to which students have learned some defined behavior domain or specific class of learner skills. These behavior domains are also referred to as objectives. Specific objectives considered important or crucial for later skills are selected for each subject area. Then, items selected to measure these objectives determine how well students have learned the knowledge or behavior described by the objectives. Objective-based tests are thus diagnostic of specific learning, rather than more broadly comparative in nature - as are the norm-referenced tests.

Strengths and weaknesses of a group of students for a given subject area are thus determined, and sometimes, though not necessarily, in relation to a norm group.

It is important in making educational program decisions to know specifically what students have learned as well as how they are generally performing in relation to other students. For this reason, the assessment of third graders included experimental objective-based tests for various subject areas. Norm-referenced and objective-based tests when combined, should provide a more complete picture of the performance of North Carolina students.

In addition to student performance tests, other instruments were used in the North Carolina assessment. Tests were developed on student perceptions in some subject areas, and a survey of teachers' and principals' needs was taken. The assessment staff also acquired school and community information on variables known to be associated with achievement.

Interpreting Test Scores

Norm-Referenced Tests

The knowledge that a student answered seventy-five items correctly on a ninety-item test tells little in itself about the achievement level of the student. If we know, however, that ninety percent of the students in the standardization sample earned scores lower than 75, we might conclude that the student in question performed rather well. The value assigned to a score, then, is determined by comparing that score with scores earned by members of the appropriate norm group. This process of comparing a student's score with a scale based on the test performance of the norm group gives useful, relative meaning to the individual student's score.

Systems have been developed for calibrating the distribution of norm group scores, making the comparison process easier and at the same time more informative. These systems clarify position of scores in relation to one another and deal with the problems of direction, distance and degree. However, as educational statisticians at the Research Triangle Institute have pointed out,... "no single statistic exists for completely meaningful interpretation of the degree of difference between (groups of scores)." Therefore, these reports will include a variety of reporting systems to aid in the perception of degree.

One system is based on the relationship between the average number of items answered correctly by groups from successive grades (grade equivalent). Another compares a student's performance against the percentage of students in the national norm group whose scores fell below the student's score (percentile rank). Still another system looks at item performance. (Norms for item performance are available for the ITBS.) The percentage of students in the national norm group who answered each item correctly provides a means of comparison for the item performance of North Carolina's students (item difficulty). Other systems compare the total distributions of the North Carolina group against the total distribution of scores in the national norm group.

The procedure for establishing national norms for comparison involves choosing a "representative" national sample of students, administering the tests to them, and determining the distribution of their scores within each grade level. For example, if a median (average) vocabulary raw score of 18 was attained by students tested during the first month of their third-grade enrollment, the developmental concept grade equivalent (GE) would assign a score of 31.0 to the vocabulary raw score of 18.

Other grade equivalent scores are established from the median (average) raw score attained by students at the beginning of other grades (i.e., 21.0, 31.0, 41.0, etc.) on this test. Grade equivalent scores corresponding to each of the ten months of school development between grades (31.0 to 41.0, etc.) are determined by dividing the raw scores between the reference points into ten intervals for the months of the school year and summer. These ten points, of course, represent an average year's development. It would be unreasonable to expect below average students to obtain ten points in a year while talented students should obtain more. The estimate of developmental skill from such a system is helpful. However, it does have limitations, is often misinterpreted and misused, and, therefore, generally not recommended as the only reporting device (see Appendix A of the 1973 Assessment Report). The following paraphrased excerpt from the Teacher's Guide to the ITBS is informative.

> The grade equivalent is an estimate of where the pupil is along the developmental continuum measured by these items, not of where he should be placed in the graded organization of the school. A second grader with a grade equivalent score of 45 is at the 90th percentile of the second grade norm group, meaning that 90 percent of the second grade pupils scored lower and 10 percent scored as well or better. This pupil should be considered as being in the upper 10 percent of the second grade. His grade equivalent of 45 does not indicate that he is ready for fourth-grade work or that he should skip the third grade.

The publisher points out this limitation does not mean that grade equivalents should not be used at all. He continues, "They are valuable indicators of pupil growth [particularly for those not considerably above or below average] but should not be used to determine a pupil's standing in his grade .... Percentile norms and stanines are provided for ... this purpose." We concur and believe that looking at performance in several ways, while remembering the limitations of each, is the better approach to valid interpretation.

Objective-Based Tests

Generally, objective-based tests results are interpreted by looking at the percentage of items achieved (or answered correctly) for a given objective. The desired level of achievement for an objective is a considered, yet subjective decision on the part of educators. In some cases, 50 percent achievement of an objective at that grade level may be acceptable; in others, 100 percent may be considered necessary for acceptable performance. The level depends on both the purposes for assessing the objective and whether or not the objective has been previously taught. In the statewide survey, objectives were selected that appeared to be commonly relevant to the curricular area throughout the state or that had some importance for state-level planning. Acceptable achievement levels may therefore vary with different subjects and objectives. This same process could be repeated at the regional or local level and the final test may again have different objectives, depending on local priorities. A statewide sample of outstanding third-grade teachers reviewed the state selection of objectives this past summer for relevance and importance to their classes. They also examined the items and estimated the success they felt their students would achieve on them. However, due to possible differences which exist across the state, a "desired" achievement level was not set for North Carolina.

Another consideration is the number of items per objective. As mentioned earlier in the "Types of Instruments" section, objectives reflect specific areas or domains of student behaviors. Because only a limited number of items can be selected for a given group of behaviors (objectives) the results on these items should be carefully interpreted as "indicators" of general performance for the objective.

If there are only two items per objective, the possible achievement levels for the objective are necessarily 0 percent, 50 percent, and 100 percent achievement. Similarly with four items for the same objective, the possible achievement levels would be expanded to 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent. This increase in items enables a more specific reporting of results at both the student and group level. Further, we have a greater assurance that the students (or groups) have adequately learned the skills or behaviors stated in the objective if four items are used rather than two. However, no set rules can be given, as some objectives can be stated with greater specificity than others and require fewer items for adequate measurement.

Generally, statewide results will be reported by objectives and reflect the percentage of students who answer a given number of items correctly for the objective. For example, if an objective has three items, results will show what percentage of students answer <u>one</u>, <u>two</u>, <u>three</u>, or <u>no</u> items correctly. The number of items a student or group is expected to answer correctly is again a considered judgment based on the particular objective and the value or priority the user places on that objective.

Information at the item level also aids in interpretation as efforts are made to diagnose specific strengths and weaknesses. Thus, the objective-based test allows flexibility to curriculum specialists in assessing important developmental skills with greater accuracy. Certainly it adds a valuable perspective to those who plan North Carolina programs to meet specific needs of North Carolina youngsters.

Making Valid Comparisons of Test Scores in North Carolina

Comparisons of test scores may be less than useful if the individuals within the groups vary greatly on important characteristics. Comparisons of the test scores of classes, schools, local school districts, or states must be carefully interpreted in light of the inherent differences among groups and those individuals who comprise the group. Group comparisons can be made validly when the groups as a whole are similar on certain basic characteristics. This section will review important characteristics which are related to achievement and which differ among the regions of the nation. These characteristics should be considered by all who seek to make appropriate comparisons. The nature of the national norm group will also be described in order that state and national comparisons can be viewed from proper perspective.

Characteristics of the National Norm Group

In interpreting norm-referenced test scores in North Carolina, it is important for the reader to know the makeup of the norm group since the state's performance comparisons are against the standards set by the students who comprise this norm group.

Prescribed conditions were set forth in the selection of students for inclusion in the ITBS norm group. The pupils in the sample had to be representative of the various ability and achievement levels in the nation. The sample had to be sufficient in number to represent adequately the many diverse elements of population within the United States. Accordingly, a sample size of slightly more than 20,000 students per grade was selected.

Sampling procedures employed seven community size categories. A number to represent socioeconomic status was developed to further stratify each

size community. It was found that two important variables that measure socioeconomic status - (1) median years of education of the population 25 years and over and (2) median family income, in thousands of dollars - had similar variability. Therefore, these two variables were summed to form an index of socioeconomic status which served as a basis for stratification of communities within a size category.

In order to compensate for incomplete administrations due to absences and other losses, weights were assigned to all raw score frequencies. Size of system, socioeconomic status, region, and public-parochial school balance were all considered in assigning these weights. The weighted distributions are believed to closely approximate those of the total population of students in the United States for each grade.

The following tables display the results of this sampling procedure. The reader can compare the national norm sample of pupils with the general population figures for both the nation and North Carolina. Table 2 shows a comparison of the percentages of students in the weighted norm sample that are within each of the national regions. The corresponding population figures are shown for North Carolina and the United States.

TABLE 2

REGIONAL PERCENTAGES IN THE NORM SAMPLE AND THE TOTAL POPULATIONS OF N. C. AND U. S.

GROUP	REGIONS				
	Northeast	Midwest	Southeast	Southwest	Far West
Norm Sample	21.4	32.3	19.9	11.2	15.2
United States Population	26.7	29.1	18.8	10.0	15.4
North Carolina Population			100.0		

Table 3 compares the percentage distribution of the students in the norm sample among seven community sizes with the percentages within these community sizes in the nation and North Carolina.

TABLE 3

COMMUNITY SIZE PERCENTAGES IN THE NORM SAMPLE AND THE TOTAL POPULATIONS OF N. C. AND THE U. S.

Group	Lower Bounds of Community Size						
	1,000,000	250,000	100,000	50,000	25,000	10,000	1-10,000
Norm Sample	9.7	11.5	7.7	9.1	8.5	10.5	42.6
United States Population	9.2	11.5	6.7	8.3	9.0	10.2	45.6
North Carolina Population (1970)	0.0	8.1	23.2	1.8	8.2	6.4	52.4

The socioeconomic categories within community size are not available from the test manuals, however, the socioeconomic index ranged from 7 to 27. This range can aid in the interpretation of Table 4 which compares the U. S. and North Carolina populations.

TABLE 4

MEDIAN YEARS OF EDUCATION AND MEDIAN FAMILY INCOME (IN THOUSANDS OF DOLLARS) FOR THE 1970 TOTAL POPULATIONS OF N. C. AND THE U. S.

Group	Median Education	Median Family Income	Socioeconomic Index
U. S. Population	12.1	9.87	21.97
N. C. Population	10.6	7.77	18.37

Although ethnic membership was not a factor in selecting or weighting of the norm group, estimates of the percentages in the norm sample as well as the total North Carolina and the United States populations is given in the next table.

TABLE 5

ESTIMATES OF THE PERCENTAGE DISTRIBUTION WITHIN ETHNIC GROUPS IN THE NORM SAMPLE, THE NORTH CAROLINA SAMPLE, AND THE U. S. STUDENT POPULATION

Group	American-Indian	Black	Oriental	Spanish/American	White
Norm Sample	0.6	15.7	0.5	4.0	79.1
United States Population (1968)	0.4	14.5	0.5	4.6	80.0
North Carolina Sample	1.2	29.0	-	-	69.0

These tables indicate that the norm sample is representative of the nation and there are significant demographic differences between pupils in North Carolina and pupils in the nation.

Additional information about third graders in North Carolina and their environment is presented in the following tables.

TABLE 6

PUPIL CHARACTERISTICS OF THE THIRD-GRADE ASSESSMENT SAMPLE

Characteristic	State Assessment Sample
Sex	
. Male	51.3%
. Female	48.5%
Racial/Ethnic Membership	
. American Indian	1.2%
. Black	29.0%
. White	69.0%
Parental Education Level	
. Neither over eighth	5.9%
. One over eighth	25.9%
. One high school graduate	44.8%
. One over high school	23.5%
Family Income Estimate	
. Less than $3,000	15.4%
. $3,000 - $15,000	75.6%
. Over $15,000	8.1%
Any Kindergarten Experience	
. Yes	39.2%
. No	53.4%
. Unknown	6.8%

North Carolina Comparisons With Other States

Because learning does not stop at the end of the school day, it is helpful to review the environment in which this out-of-school learning occurs. North Carolina, the twelfth most populous state in the nation has been described as a "state of magnificent variety." The agriculture and industry of North Carolina are varied, with the state producing two-thirds of the country's flue-cured tobacco and leader in fabric and furniture

manufacture. Tourism also flourishes in North Carolina as thousands annually visit its mountains, parks, golf courses, shores, and sites for boating and fishing. Clearly, such diversification makes it difficult to describe the "typical" North Carolinian.

The diversity continues when such variables as individual income, occupation, race, and education are considered. These factors and the values placed on them vary not only by county and region, but within communities as well.

In studying educational status and change over time it is essential to examine achievement in conjunction with environmental factors. Of these elements, socioeconomic factors, in particular, are associated with educational opportunity and attainment, and these exert a major influence on a child's growth and development. Educators must consider these tangibles and, more importantly, the values and ethics implicit in a child's immediate environment. The remainder of this section will contrast the environment of the North Carolina pupil with the environment of pupils in other states.

A state's population, size, and population distribution are basic environmental factors. The following tables show North Carolina's relative ranking. More detailed information is included in the Appendix.

TABLE 7

NORTH CAROLINA'S RANK AMONG THE FIFTY STATES
ON BASIC DEMOGRAPHIC FACTORS

Factor	North Carolina's Rank
Land Area (1970)	29
Population (1973)	12
People Per Square Mile (1970)	17
Percentage Classified Rural (1970)	5
Percentage Black (1970)	6
Median Age (1970)	15

As evident here, North Carolina students are from a more populous state where the people are younger, more likely to be of a minority group, and live in smaller towns than people in most states. It is also apparent that the degree of rurality is twice that of the national average while the density is slightly above average.

TABLE 8

NORTH CAROLINA'S RANK AMONG THE FIFTY STATES
ON BASIC SOCIOECONOMIC FACTORS

Factor	North Carolina's Rank
Per Capita Income (1972)	34
Households With Cash Incomes of $3,000 or less (1972)	12
Per Family Income (1970)	40
Median Years of Education (1970)	46

North Carolina's students do not share in as much of the basic socioeconomic wealth as do students from other states. That is, North Carolina ranks among the lowest ten states on important characteristics such as income and education level of adults.

Thus, North Carolina's combination of factors associated with income, ethnic composition, degree of rurality, and adult education level seem to indicate a "non-typical" background for her youth. A picture emerges of an environment which may not reinforce maximum educational progress.

Comparisons Within North Carolina

Just as there are strong differences between North Carolina and the average composite for the nation, there are great variations within the state's boundaries. Particularly important is the variety which exists

with the differing traditions and personalities of its Mountain, Piedmont, and Coastal Plains groups. The following table describes some of these differences:

TABLE 9

GENERAL ENVIRONMENTAL FACTORS WITHIN NORTH CAROLINA

Factor	Mountains	Piedmont	Coastal Plains	State
Population (1970)	760,760 (15%)	2,692,975 (54%)	1,628,323 (32%)	5,082,059
Growth (1960-1970)	11%	21.3%	7.7%	11.5%
Distribution of Black Population (1970)	41,459 (4%)	569,575 (51%)	515,444 (46%)	1,126,478
Percentage Black (1970)	5.4%	21.1%	31.6%	22.2%
Percentage Classified Rural (1970)	75.1%	45.9%	60.6%	55.0%
Percentage That Moved (1965-70)	40.5%	46.0%	49.2%	46.2%

These basic environmental factors indicate that a majority of the people - black and white - live in the Piedmont; the Mountains have the highest percentage of the people living in rural areas; and the Coastal Plains population has a greater proportion that is black. Perhaps the major point in these figures is the variety between these three major geographical divisions. As disclosed earlier some of these same variables have been shown to be related to achievement.

Distribution of economic resources in these three regions also varies as the following table shows:

TABLE 10

SOCIOECONOMIC FACTORS WITHIN NORTH CAROLINA

Factor	Mountains	Piedmont	Coastal Plains	State
Family Income	8,059	10,234	7,757	9,139
Family Income Female Head (1970)	5,017	5,620	4,104	5,017
Average Percentage Free School Lunch	35.2%	37.6%	64.7%	47.8%
Percentage Living Below Poverty	20.2%	15.1%	28.8%	20.3%
Percentage of all Families Below Poverty with Children Under 18	10.7%	8.9%	19.2%	12.3%
Percentage of all Children Under 18 From Poverty Families	20.5%	17.4%	34.4%	23.6%
Percentage of Children Under 18 Living with Both Parents	82.6%	80.1%	73.7%	78.3%

Because socioeconomic status is a strong predictor of academic success, regional differences in educational achievement are to be expected. Thus, any academic comparisons should be carefully tempered by these background differences.

Still another factor associated with academic achievement is the educational environment. Regional patterns are suggested in the table below:

TABLE 11

EDUCATIONAL FACTORS WITHIN NORTH CAROLINA

Factor	Mountains	Piedmont	Coastal Plains	State
Average of Median Years of Education - Adults Over 25	9.5	10.2	9.9	10.6
Adult Education Index	2.50	2.82	2.56	2.69
Percentage of High School Graduates of Those 16-21 Not In School	49.7%	48.7%	44.0%	46.7%
Taxing for Education Index	417	507	439	478

These environmental, socioeconomic, and educational factors are a major influence on a child's educational growth and development. Educators who consider regional comparisons must be aware of the differential effects that these factors contribute within regions. Certainly, expectations are better determined with an awareness of the status of these variables irrespective of whether local, regional, or state comparisons are being made.

HIGHLIGHTS

Two tests were used to measure mathematics achievement of third graders in the 1974 State Assessment of Educational Progress: the Iowa Tests of Basic Skills and the objective-based SCORE Mathematics Test. Major findings were as follows:

- North Carolina's third grade students, on the average, scored several months below the nation in mathematics on the standardized Iowa Tests of Basic Skills.

- Approximately 40 percent of both North Carolina's and the nation's students scored within the average or third grade score interval. However, more of North Carolina's students scored below the average or third grade score interval than did the nation's students, and more of the nation's students scored above the average interval than did North Carolina's third graders.

- The ranges of the national and North Carolina score distribution are quite similar, but proportionately more of North Carolina's students than the nation's students scored in the score interval just below the average score interval.

- This difference in the score distributions is reflected in the mathematics grade equivalent averages for North Carolina (31.1) and for the nation (38.0).

- North Carolina and the nation differed little on the percentage of students correctly responding to individual items of the ITBS. Generally, the national item percentage achievement exceeded North Carolina's achievement by six to eight percentage points.

- North Carolina's third grade students scored satisfactorily on a majority of the SCORE mathematics objectives.

- North Carolina's students scored well in the broad areas of measurement, counting, basic computations, geometry and graphs.

- North Carolina's students scored somewhat below standard on the broad areas concerning the U. S. monetary system, modern mathematics concepts, complex computational problems, and fractions.

MATHEMATICS ACHIEVEMENT

As part of the 1974 State Assessment of Educational Progress, the mathematics achievement of 5,000 randomly selected third graders was measured in April, 1974. Approximately half of the 5,000 students were given the Concepts and Problem Solving subtests of the Iowa Tests of Basic Skills (ITBS). The other half of the students were tested with the objective-referenced Mathematics Test developed by the State Department of Public Instruction's Division of Mathematics in conjunction with SCORE (School Curriculum Objective-Referenced Evaluation), a service for creating customized objective-referenced tests.

This report will describe the two complementary tests used in the mathematics assessment and will report the students' performance on both of them. It will also present a summary of teachers' and principals' perceptions of their mathematics programs.

Summary of Principals' and Teachers' Perceptions of Their Mathematics Programs

Before considering the descriptions and results of the ITBS and the SCORE Mathematics Test, it might be helpful to summarize principals' and teachers' views concerning their mathematics programs. This information was obtained through two surveys which were part of the 1974 State Assessment of Educational Progress: the "School Information Questionnaire" for principals and the "Teacher Questionnaire." There were 618 principals and 12,875 K - 6 teachers and other educators responding to the random-sample survey.

Over 86 percent of the elementary teachers report that their professional training in mathematics teaching was at least adequate, and 90 percent of the teachers state that they are proficient in the teaching of mathematics. Despite these positive perceptions, teachers (as well as principals) recognize several areas which they believe negatively affect mathematics instruction.

Specifically, teachers and principals agree that a lack of supplies and materials is a serious handicap to effective mathematics instruction. In fact, teachers ranked mathematics as the second academic subject, behind science, that is most affected by this obstacle. In addition to this problem, principals indicate a need for specially trained teachers to assist the classroom teachers in the area of mathematics. Mathematics was judged as the second academic subject, after reading, which would most benefit by the addition of specially trained personnel.

Only one-third of the responding elementary teachers report using the State Department source book, "Mathematics Goals and Activities," and only two out of five teachers indicate that they have attended a mathematics workshop within the last three years.

For further information concerning the principal and teacher questionnaires, the reader is referred to the Division of Research report, "Educational Progress in Grade Three: A Survey of Teachers and Principals."

Description of ITBS and SCORE Mathematics Tests

ITBS Description

The mathematics skills items of the ITBS are grouped into two subtests (Concepts and Problem Solving) paralleling the textbook offerings throughout the nation. The ITBS provides two subtest scores as well as a total mathematics achievement score.

Both subtests cover most of the following areas: U. S. monetary system, equations, fractions, geometry, measurement, equalities, inequalities, numeration, and whole numbers, and numerical computation. Although both the Concepts and Problem Solving subtests deal with the same areas, they approach the testing of these areas from opposite viewpoints. In the Concepts section, the emphasis is on the understanding of our number system--its terms, processes, and operations. Therefore, this subtest deals with the logic of the computational process. In contrast, the Problem Solving section tests numerical computation. Thus, mathematics competence is tested in both a theoretical and applied setting.

SCORE Test Description

For diagnostic purposes, the Division of Mathematics of the State Department of Public Instruction supplemented and expanded the concepts measured in the ITBS by developing the objective-referenced Mathematics Test, with the assistance of SCORE. This test was constructed by selecting test items to measure specific math objectives. Specifically, the SCORE Mathematics Test expanded the ITBS areas of measurement,

equations, inequalities, geometry, whole numbers, and numerical computation and introduced items dealing with sets, graphs, and number sequences. For a listing of the SCORE mathematics objectives the reader is referred to the Appendix.

Thus, through the use of both the ITBS and SCORE mathematics tests, North Carolina's third grade students were exposed to most, if not all, of the mathematics objectives thought to be important at this developmental level.

ITBS Mathematics Results

Comparison of State and National Averages

To explain the results, it is necessary to compare the distribution of North Carolina's student scores with that of the national sample. These score distributions are presented in Table 1.

TABLE 1

PERCENT OF NORTH CAROLINA AND NATIONAL STUDENTS SCORING AT VARIOUS GRADE EQUIVALENT RANGES ON THE ITBS MATHEMATICS TEST

Area	Grade Equivalent Ranges				
	00-19	20-29	30-39	40-49	50-69
Nation	2.0%	22.0%	39.0%	28.0%	9.0%
N. C.	9.4%	33.4%	37.8%	16.5%	2.9%

Table 1 reveals that approximately 40 percent of both North Carolina's and the nation's sample scored within the average or third grade

interval (grade equivalent 30-39). However, more of North Carolina's students scored below the average on third grade interval than did the nation's students, and more of the nation's students scored above the third grade interval than did North Carolina's third graders.

Thus, both similarities and contrasts are detected in the basic pattern of the North Carolina student score distribution and the national student score distribution. The ranges of both score distributions are quite similar, but the two distributions are different in that proportionally more of North Carolina's sample than the national sample scored in the score interval just below the average score interval.

This difference in the score distributions is illustrated by comparing the graph of North Carolina's distribution with the graph of the national distribution. These graphs are presented in Appendix A.

This difference in the score distributions is naturally reflected in the grade equivalent averages which were computed for North Carolina's and the nation's mathematics achievement scores. The grade equivalent average is 38.0 for the national sample and 31.1 for the North Carolina sample. Thus, if it is assumed that educational development is constant throughout the year, there is a seven month developmental difference between North Carolina and the nation at the third grade. However, this explanation is not completely tenable because educational development does not occur uniformly throughout the year. Therefore, perhaps a better interpretation of the results would be: (1) North Carolina's third grade students did, on the average, score several months lower on this test than did the nation's third grade students; (2) fifty-seven percent of North Carolina's third grade students, who

were given the test in April, scored within or above the third grade equivalent interval; (3) seventy-six percent of the pupils in the nation scored within or above the third grade equivalent interval.

ITBS Subgroup Results

In addition to the state and national comparisons reported above, the scores computed for third grade pupils within North Carolina were also analyzed in terms of region, race/sex category, family income level, and parental educational level. Since the averages for both subtests followed the same general score patterns as did the composite average for each of the classification variables, only the composite average will be reported. For subtest information the reader is referred to Appendix A.

ITBS Results by Region

On the average, Piedmont students attained about the same composite score as the state. Mountain third graders averaged slightly above state, while Coastal Plains students averaged somewhat below the state.

In specific terms, Coastal Plains third graders, on the average, scored 29.9 (one month below the state average). Piedmont students scored 31.2, which is approximately the state average, and the Mountain students scored 34.0 (three months above the state average).

ITBS Results by Race and Sex

When North Carolina student scores were analyzed by the combined variable of sex and race, it was found that little difference existed between averages for black males and black females and between averages for white males and white females. The averages for these four groups

are 25.0, 25.3, 33.6, and 33.6, respectively. Thus, the averages for black males and black females are approximately six months below the state average, while the state average is approximately two to three months below the average for white males and white females.

ITBS Results by Parental Education Level

Students having at least one parent who graduated from high school averaged 32.3 on the composite ITBS mathematics score (one month above the state average). Scoring above the state average by almost six months were the students who had at least one parent with post-high school training (36.6 average). Students having both parents with less than an eighth grade education averaged 26.0 (five months below the state average). The average was 27.8 (three months below the state average) for those students having at least one parent who completed more than eighth grade but did not complete high school.

ITBS Results by Family Income Level

Students whose family income is above $15,000 averaged 38.6 (eight months above the state average). Those whose family income is below $3,000 averaged 25.6 (six months below the state average).

Summary of ITBS Subgroup Results

From these analyses, it is apparent that the average scores differ for various subgroups of North Carolina's third grade students. However, it should be remembered that these are just averages. Within any given classification there are students who score just as high or just as low as students in other classifications. The difference lies in the fact that a greater proportion of students within each classification scored either above or below the state average.

ITBS Diagnostic Results

In addition to the previous analysis, item difficulty analysis was performed on each subtest of the ITBS mathematics test. It was found that North Carolina's students responded in much the same way with respect to the difficulty of each item as did the nation's third graders. However, for any given item the percent of correct responses differed for North Carolina and the nation (see Appendix B). On some items, a greater percentage of the nation's students answered correctly, while on other items a greater percentage of North Carolina's students answered correctly. Specifically, on the Concepts subtest, North Carolina's students ranged from three percentage points higher than the nation on some items to 17 points below on others. The best estimate is that about eight percent more of the nation's third graders correctly answered the items found in the Concepts subtest.

On the Problem Solving subtest, North Carolina's item difficulty plot closely follows that of the nation. The percent of North Carolina students responding correctly to each item ranges from three percentage points above the nation to 14 points below. This information might be interpreted to say that on the average, approximately six percent more of the nation's third graders answered these subtest items correctly.

Using as a standard the percent of national third graders correctly responding to an item, it may be concluded that North Carolina's students scored best in the areas concerning the reading of time, computing units of measurement, operating with number sentences and sequences, recognizing numbers and subsets of numbers, and computing simple addition, subtraction and multiplication problems which require no regrouping

operations. On the other hand, there were several areas on which North Carolina students scored noticeably below the nation. These areas covered problems involving U. S. currency and weight, applying the number line, understanding mathematical properties and laws of the number system, estimating the value of whole numbers, and rounding off whole numbers.

SCORE Test Results

The objective-referenced SCORE Mathematics Test was designed to expand and Supplement the ITBS Math Test. However, unlike ITBS items, SCORE items were devised to measure student mastery of specific mathematics objectives. Analysis of an objective-based test such as the SCORE Mathematics Test requires comparison of student performance to a standard rather than comparison of an individual's or group's performance to the performance of a norm group.

In assessing the quality of the objective-based SCORE test, the following questions should be asked: "Have the objectives been judged appropriate and/or important for North Carolina's third grade students?" "How well did the items measure the objectives?" "How difficult were the items for third grade students?"

To provide answers to these questions, outstanding third grade teachers were selected as respondents for two questionnaires concerning objective and item appropriateness and item difficulty. (See Appendix C.) Since it is necessary to refer to teachers' responses while discussing the student achievement on the SCORE test, students' results will be categorized and reported by five general areas specifically

developed to summarize the teachers' questionnaire data. These five "objective clusters" will be presented in descending order of objective importance. Because teachers overwhelmingly rated all the test items as appropriate measures, the factor of item appropriateness is deleted from the categories below.

Objective Cluster One

In the first cluster, which dealt with such basic skills areas as recognition of numerals and performing basic calculations, the objectives were judged as being very important for and generally being taught to North Carolina's third grade students. In addition, the items designed to measure these objectives were judged as not being very difficult for third graders.

On the average, between 84 percent and 90 percent of North Carolina's students correctly responded to items measuring this group of objectives. In view of the questionnaire information, the conclusion was drawn that North Carolina's students demonstrated a high level of performance on these objectives. (See Appendix C.)

Objective Cluster Two

The second group of objectives dealt with such mathematics areas as measurement techniques and number properties. These objectives were also judged very important for and now being taught to North Carolina's third graders, but the items measuring these objectives were rated as somewhat more difficult than items in the previous category.

On the Cluster two objectives, North Carolina's students scored somewhat lower than on the Cluster One objectives. However, they demonstrated satisfactory achievement, because the percent of students correctly responding to these items ranged from 62 percent to 83 percent. Two exceptions to this statement should be noted. In the areas requiring the student to recognize and apply inequality symbols in number statements and to recognize a number and its equivalent number statement, North Carolina's students scored somewhat below standard.

Objective Cluster Three

A third category of objectives tested the students' knowledge in the broad area of geometry and in the interpretation of graphs. These objectives were judged to be less important than objectives in Clusters One and Two and, in general, were reported as not being taught at the third grade. However, the items associated with these objectives were not deemed too difficult.

Between 87 percent and 96 percent of North Carolina's students chose the appropriate response for this group of items. (See Appendix C.) Thus, there was a high degree of achievement on these objectives even though they were not generally being taught in North Carolina's third grade mathematics programs.

Objective Cluster Four

The fourth objective cluster, which included such areas as subtraction and the checking of subtraction problems by addition, was evaluated as being generally important. Further, these objectives were

reported as generally being taught at the third grade level. The items designed to measure these objectives were judged to be fairly difficult.

On these objectives North Carolina's third grade students demonstrated a less than desirable achievement level, with between 34 percent and 65 percent of the students responding correctly.

Objective Cluster Five

Finally, one objective which dealt with fractions of sevenths, eighths, and tenths was judged as inappropriate for third grade students. In addition, this objective was reported as generally not being taught to North Carolina's third graders, and the items for this objective were judged as very difficult.

On this objective only 38 percent of the students responded correctly. It is wrong to conclude from this that North Carolina's students scored unsatisfactorily, because this objective was rated as inappropriate. However, it should be reported that student performance on other objectives dealing with simpler fractions was judged to be slightly below standard.

Summary of SCORE Results

In conclusion, North Carolina third grade students scored at least satisfactorily on a majority of the SCORE mathematics objectives, while performing less than satisfactorily on others.

It should be remembered that the information just presented has been a summary. For a more detailed presentation of the SCORE Mathematics Test, the reader is referred to Appendix D which presents the

results of the SCORE item cluster analysis.

Conclusion

The final question remains: "What do all these analyses say about the basic mathematics skills of North Carolina's third grade students?"

Some answers are as follows: (1) North Carolina's third grade students, on the average, scored somewhat below the nation on the standardized ITBS Mathematics Subtests, (2) North Carolina's third grade students scored satisfactorily on a majority of the SCORE mathematics objectives, (3) North Carolina's third grade students did well in the broad areas of measurement, counting, basic computations, geometry and graphs, (4) North Carolina's third grade students scored somewhat below standard on the broad areas concerning the U. S. monetary system, modern mathematics concepts, complex computational problems, and fractions.

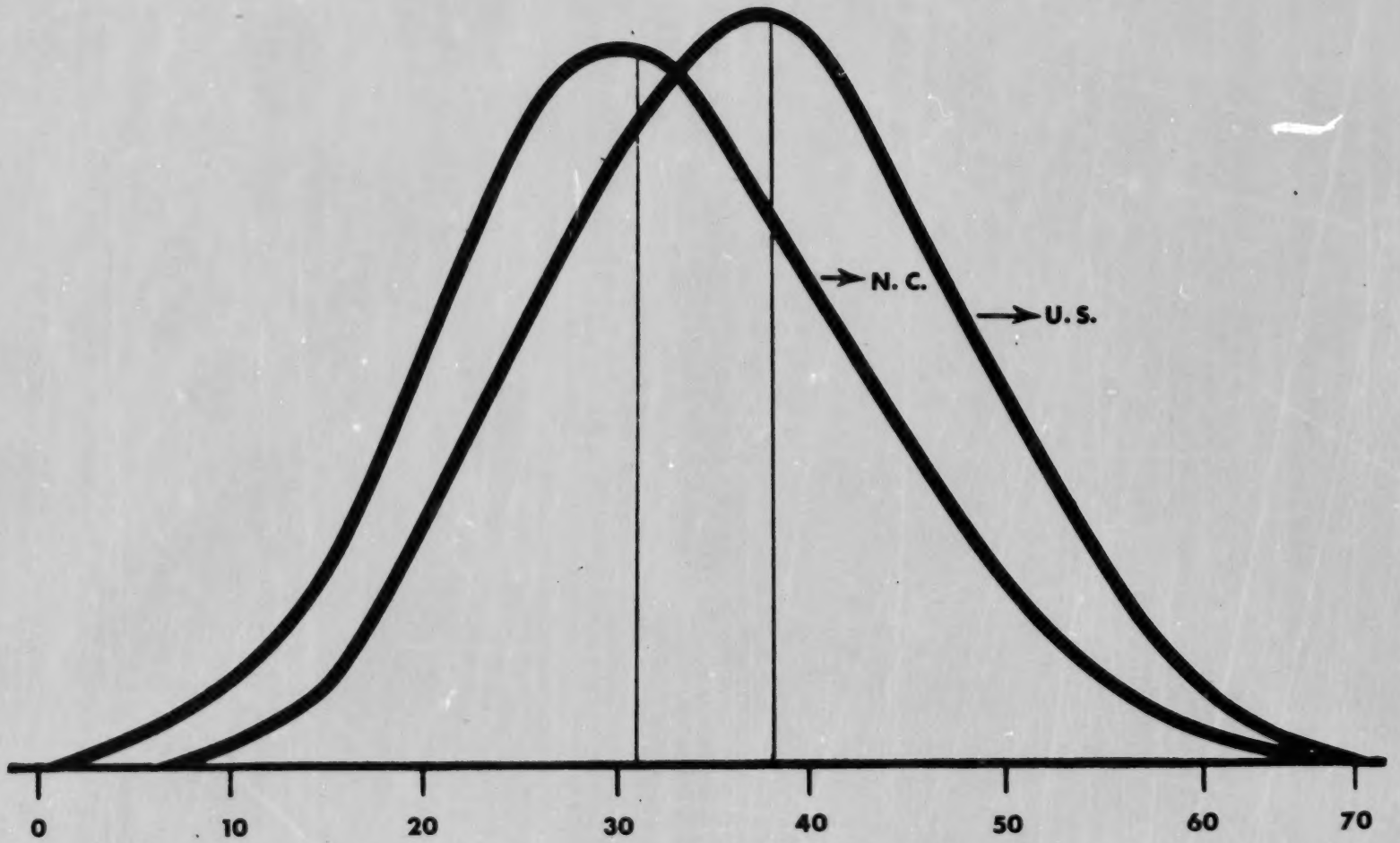
APPENDICES

APPENDIX A

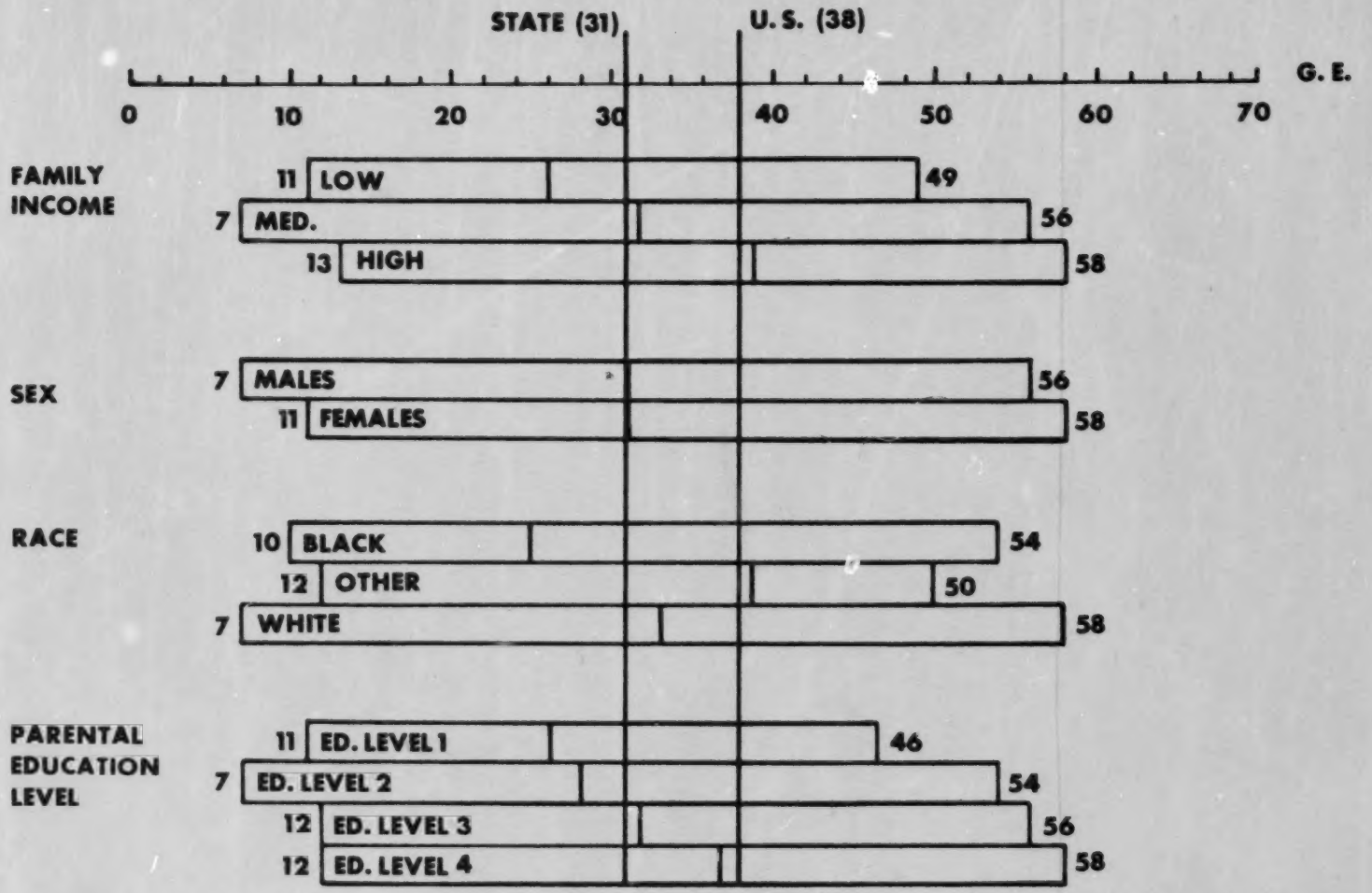
MATH TOTAL AND SUBTEST AVERAGE GRADE EQUIVALENT
SCORES FOR NORTH CAROLINA AND VARIOUS CLASSIFICATION VARIABLES

	Subtests		Math
	Concepts	Problem Solving	Total
STATE	30.7	31.4	31.1
CLASSIFICATION VARIABLES			
Coastal Plains	29.9	29.9	29.9
Piedmont	30.6	31.6	31.2
Mountain	33.5	34.2	34.0
Male	30.7	31.4	31.2
Female	30.8	31.3	31.0
Black	24.6	25.6	25.1
White	33.3	33.8	33.6
PARENTAL EDUCATION LEVEL			
Neither over eighth	25.2	26.2	26.0
1 over eighth	27.1	28.3	27.8
1 high school graduate	32.0	32.4	32.3
1 over high school	36.7	36.5	36.6
FAMILY INCOME			
Low (under) $3,000	25.1	26.0	25.6
Medium ($3,000-$15,000)	31.1	31.7	31.5
High (over $15,000)	38.3	38.8	38.6

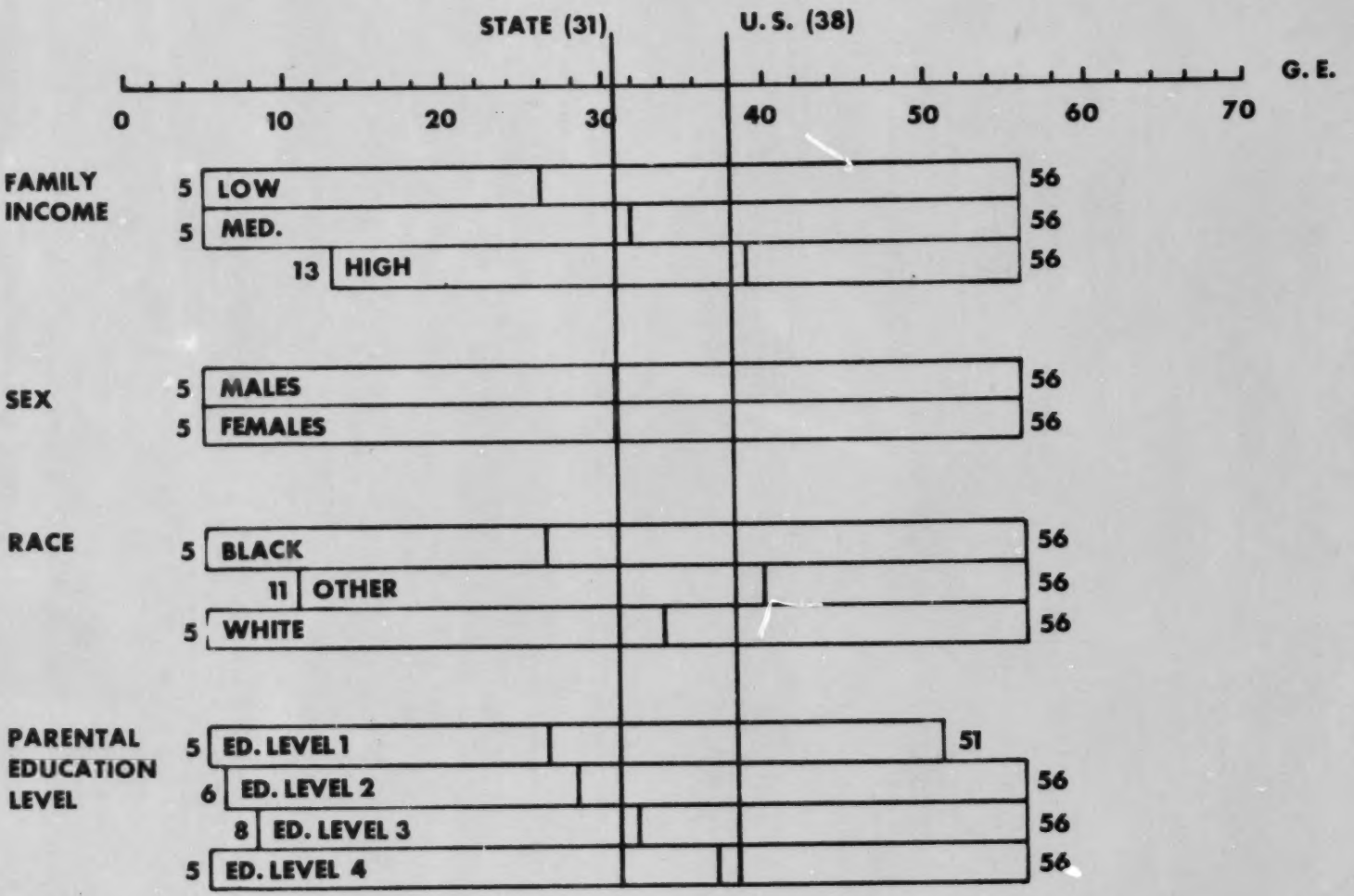
ITBS TOTAL MATH SCORE DISTRIBUTION
FOR
NORTH CAROLINA AND THE NATION



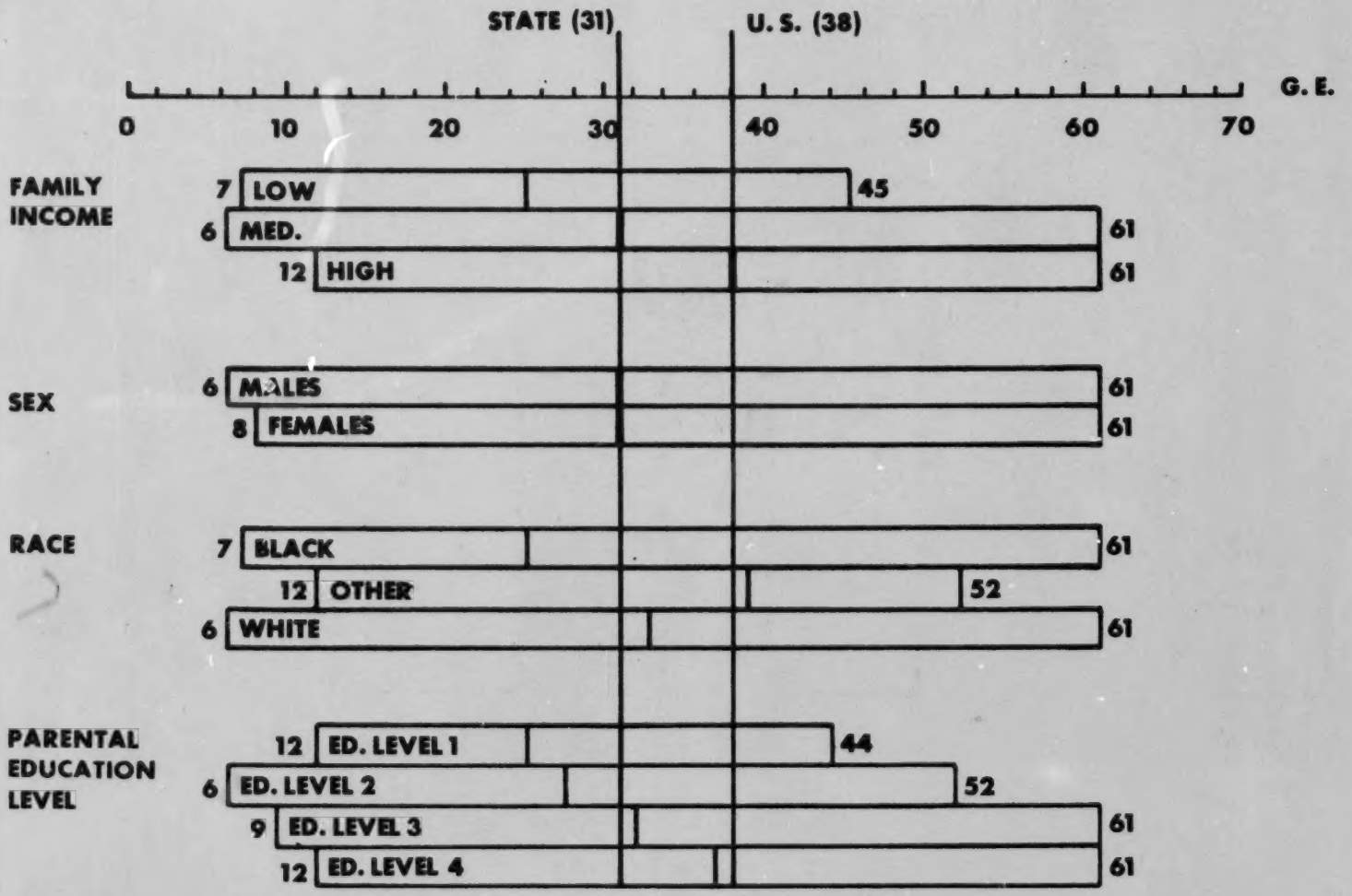
AVERAGE SCORES AND RANGES BY CLASSIFICATION VARIABLES ON THE ITBS MATH TOTAL SCORE



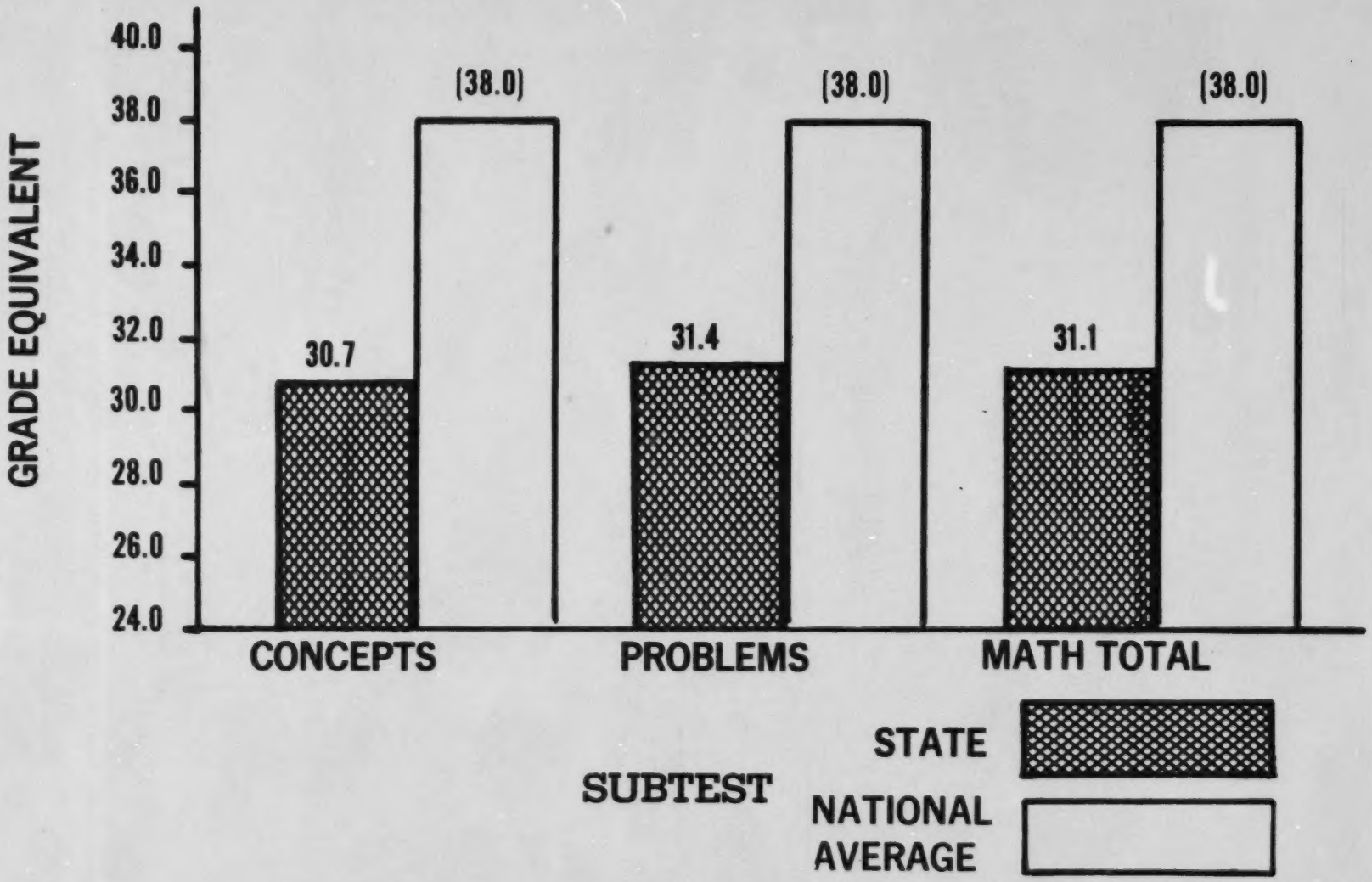
AVERAGE SCORES AND RANGES BY CLASSIFICATION VARIABLES ON THE ITBS MATH PROBLEMS TEST

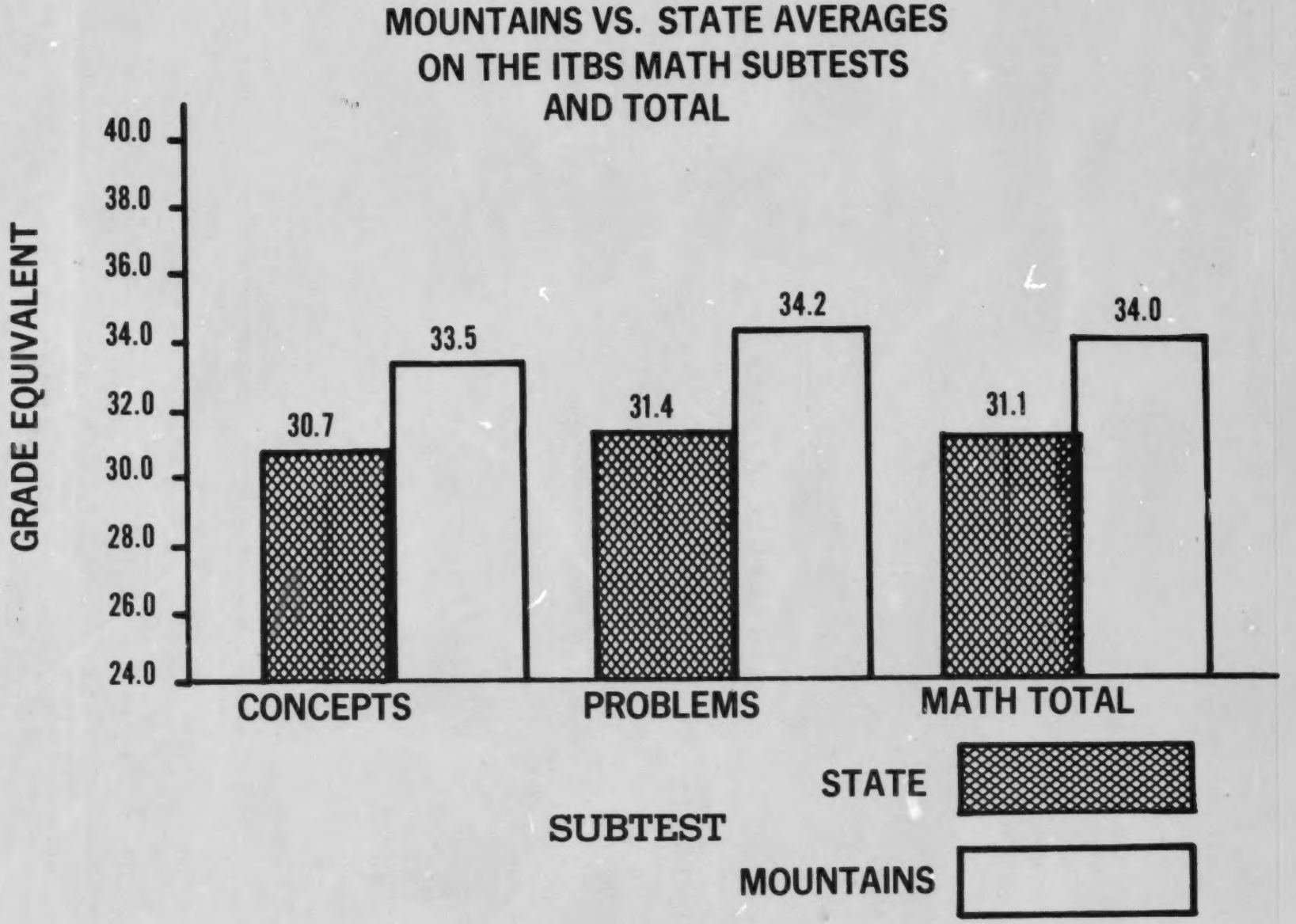


AVERAGE SCORES AND RANGES BY CLASSIFICATION VARIABLES ON THE ITBS MATH CONCEPTS TEST

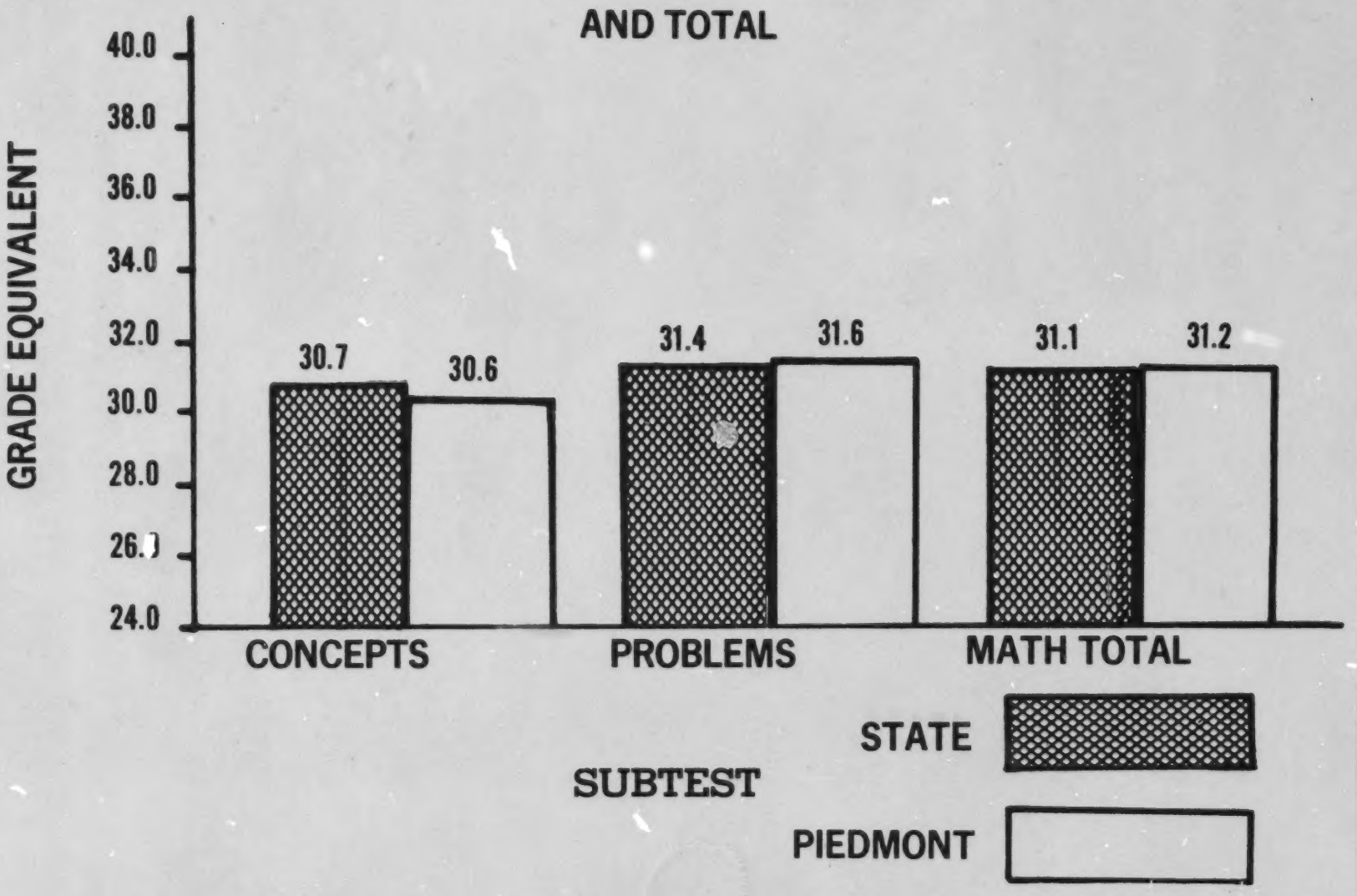


NATIONAL VS. STATE AVERAGES ON THE ITBS MATH SUBTESTS AND TOTAL

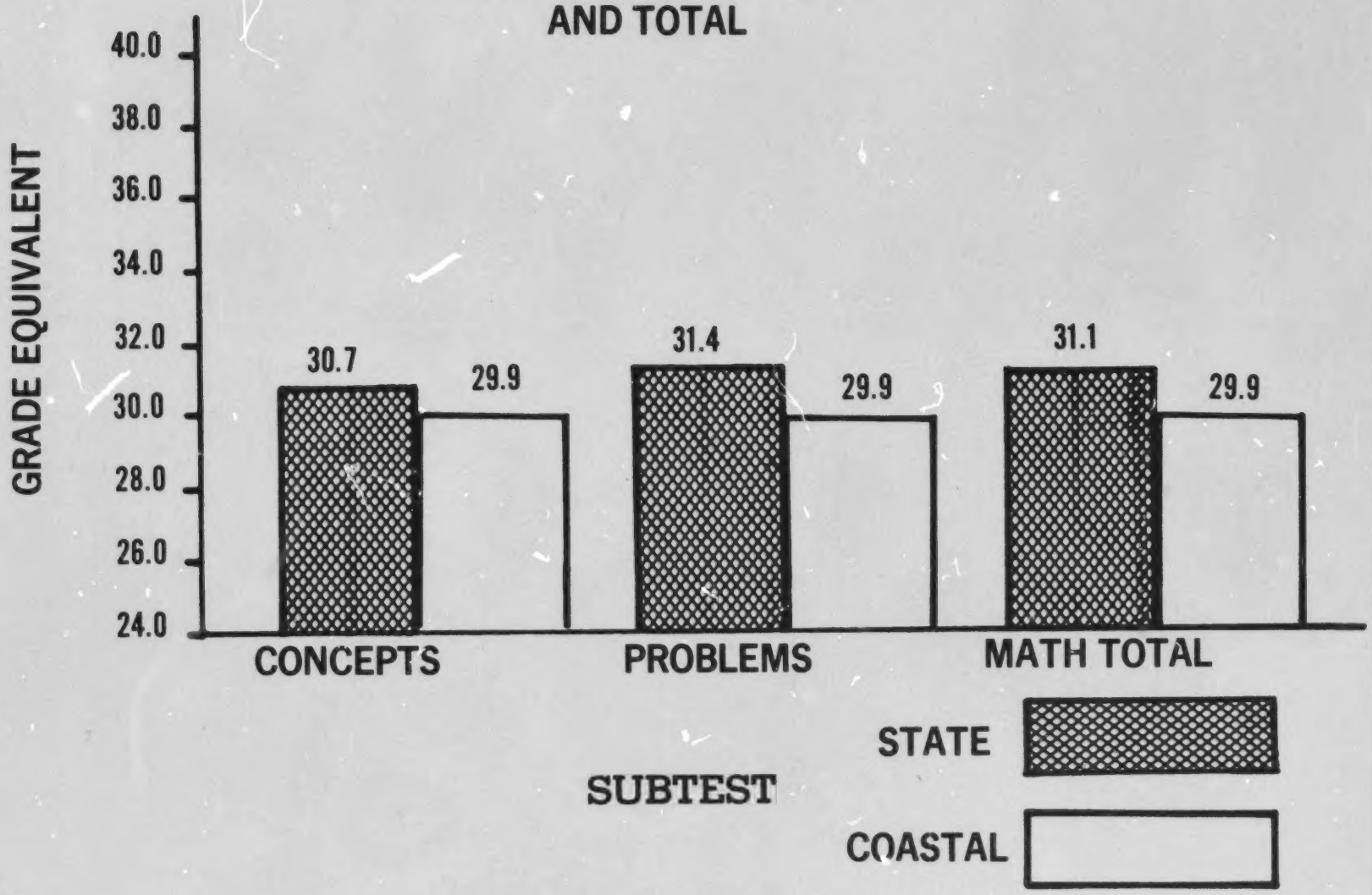


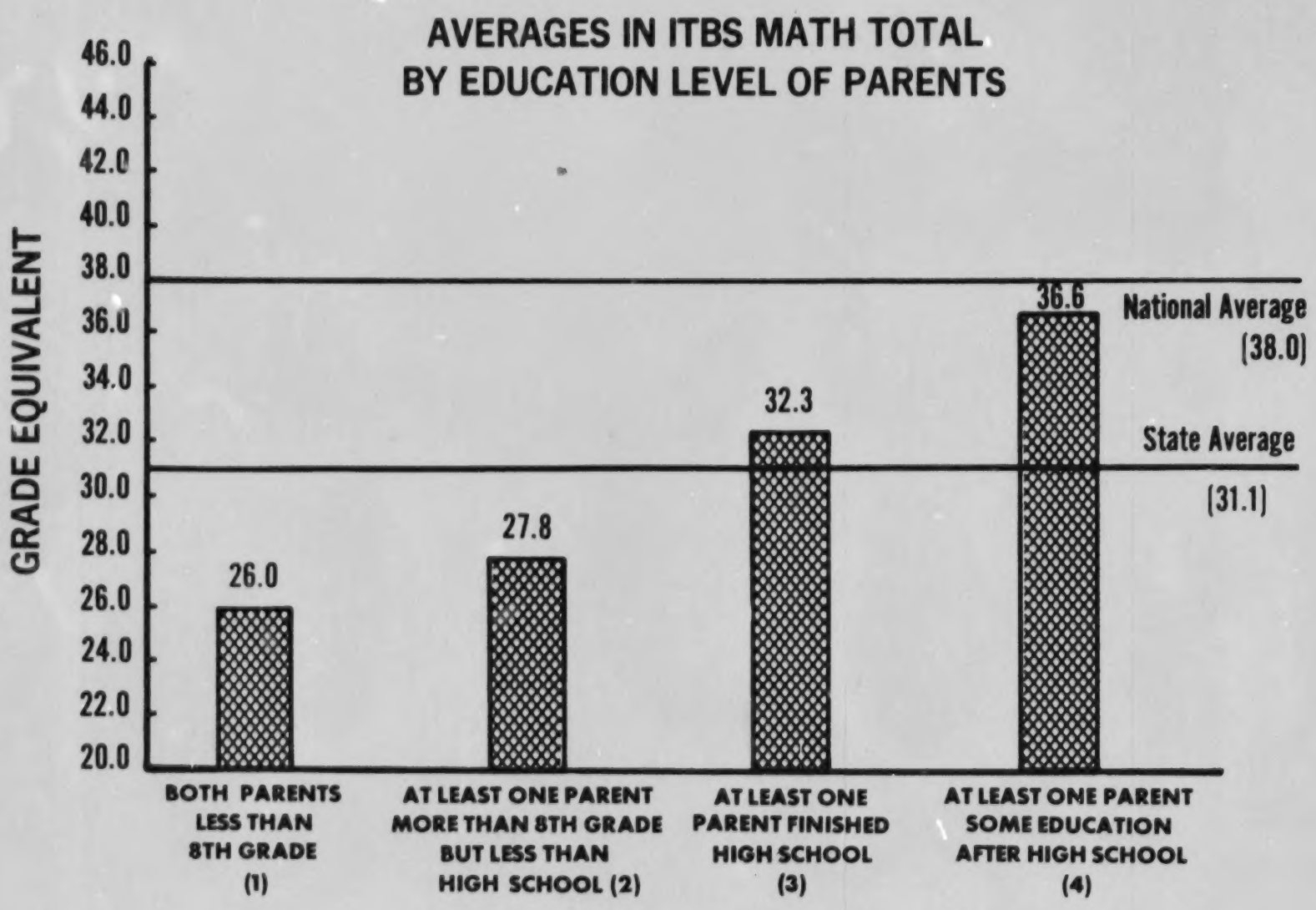

MOUNTAINS VS. STATE AVERAGES
ON THE ITBS MATH SUBTESTS
AND TOTAL
GRADE EQUIVALENT
40.0
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
30.7
33.5
31.4
34.2
31.1
34.0
CONCEPTS
PROBLEMS
MATH TOTAL
SUBTEST
STATE
MOUNTAINS

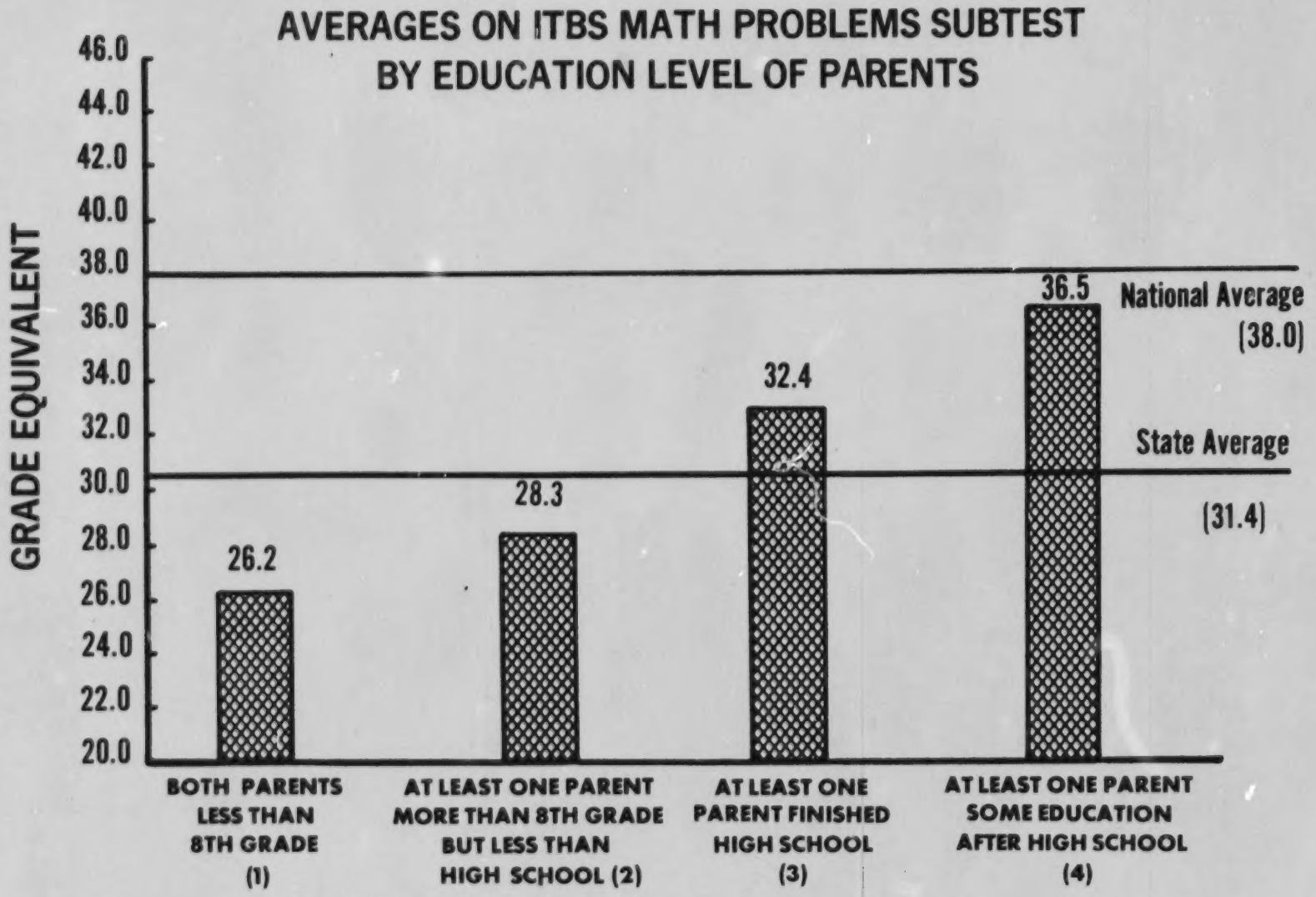
PIEDMONT VS. STATE AVERAGES ON THE ITBS MATH SUBTESTS AND TOTAL



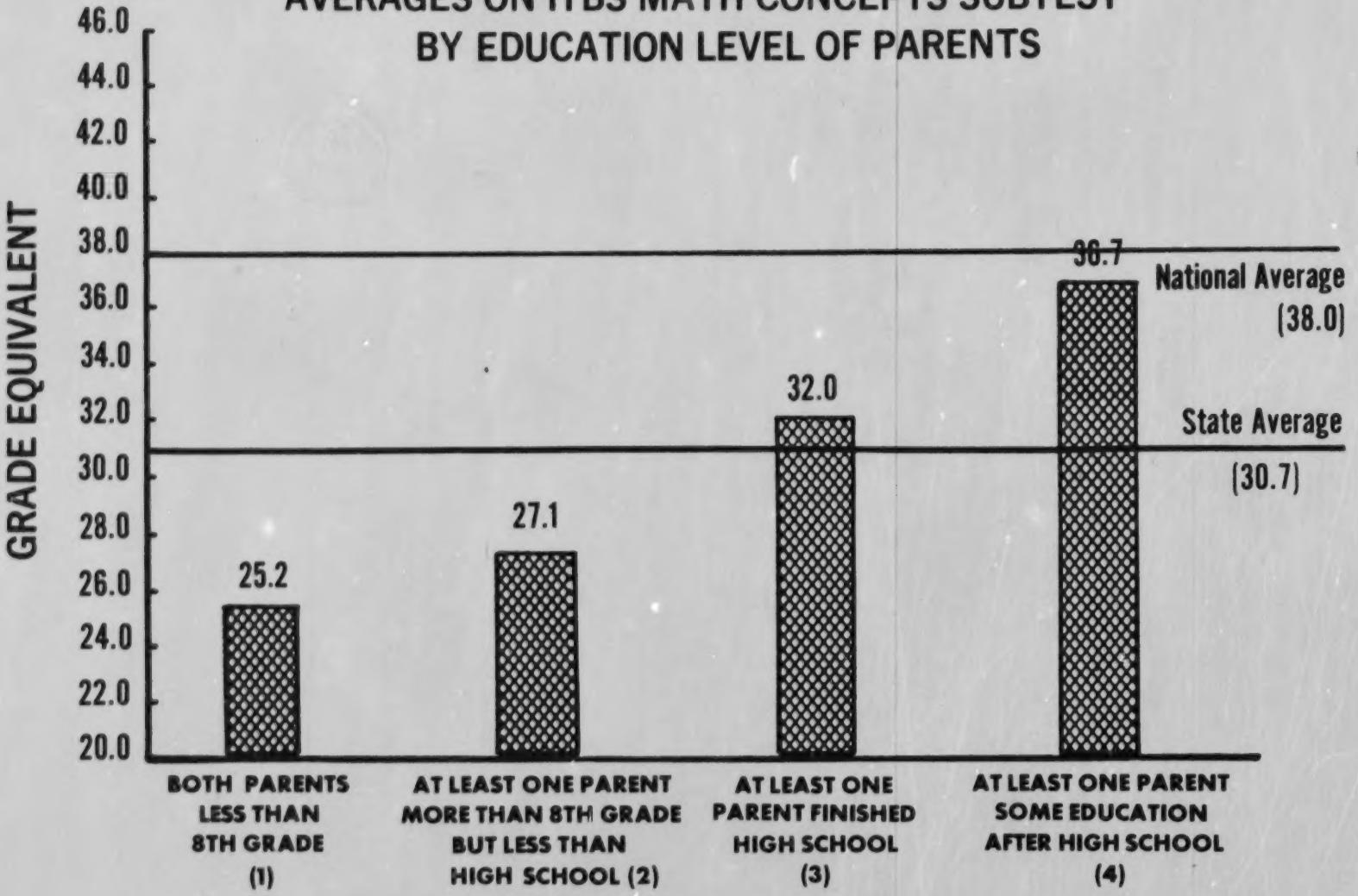
COASTAL PLAINS VS. STATE AVERAGES ON THE ITBS MATH SUBTESTS AND TOTAL

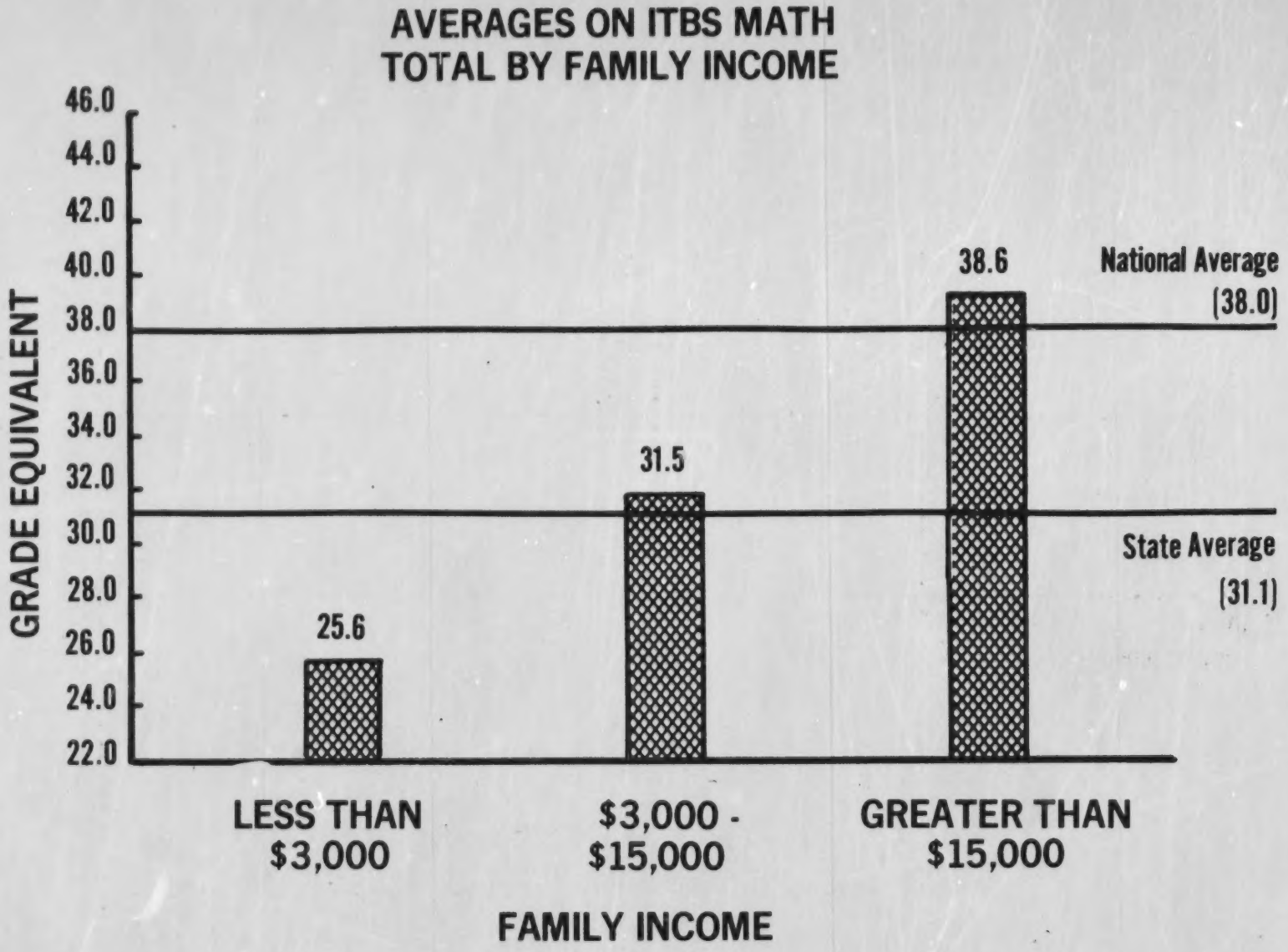


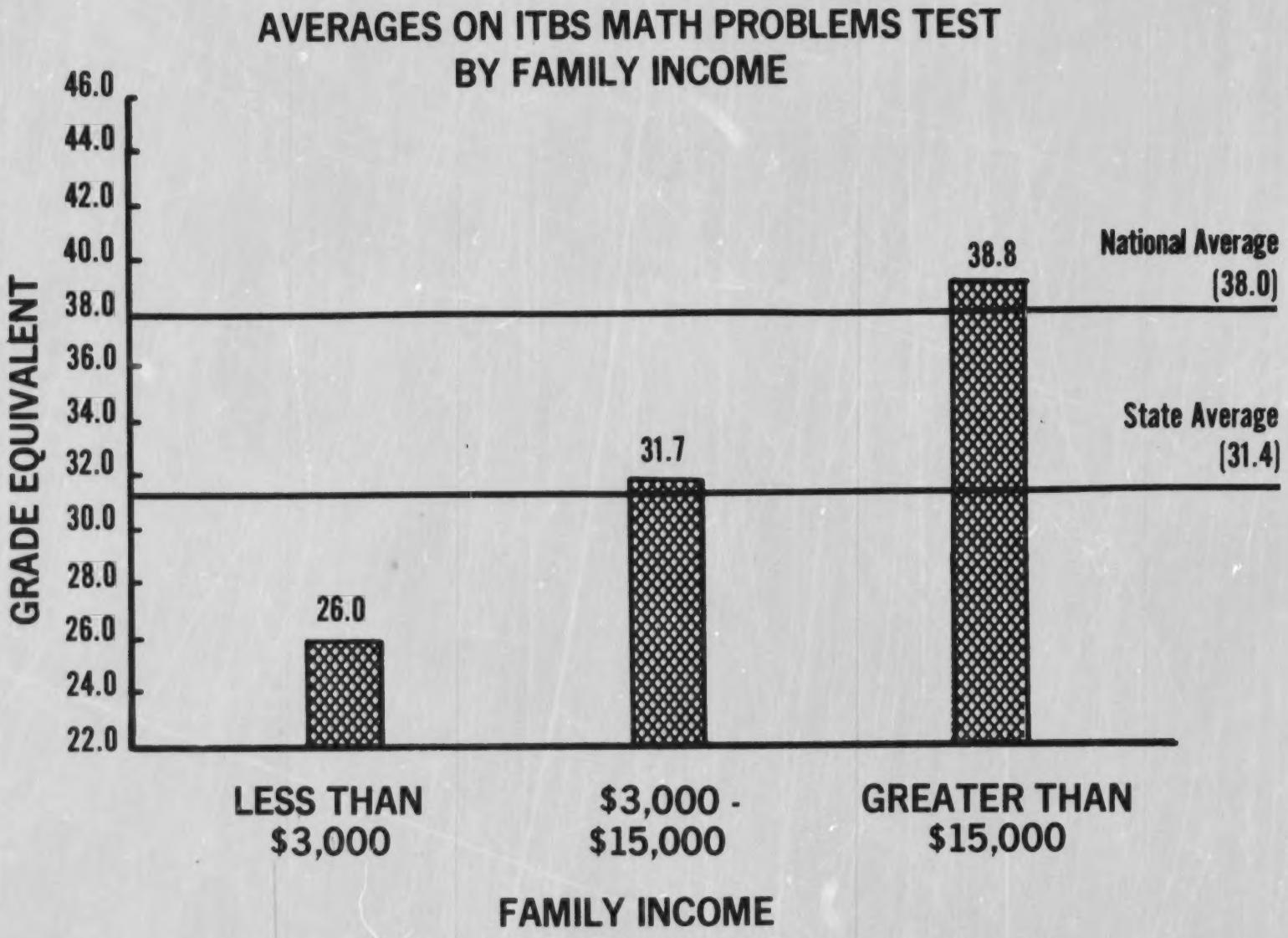

AVERAGES IN ITBS MATH TOTAL
BY EDUCATION LEVEL OF PARENTS
GRADE EQUIVALENT
46.0
44.0
42.0
40.0
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
26.0
27.8
32.3
36.6
National Average
(38.0)
State Average
(31.1)
BOTH PARENTS LESS THAN 8TH GRADE (1)
AT LEAST ONE PARENT MORE THAN 8TH GRADE BUT LESS THAN HIGH SCHOOL (2)
AT LEAST ONE PARENT FINISHED HIGH SCHOOL (3)
AT LEAST ONE PARENT SOME EDUCATION AFTER HIGH SCHOOL (4)
EDUCATION LEVEL OF PARENTS

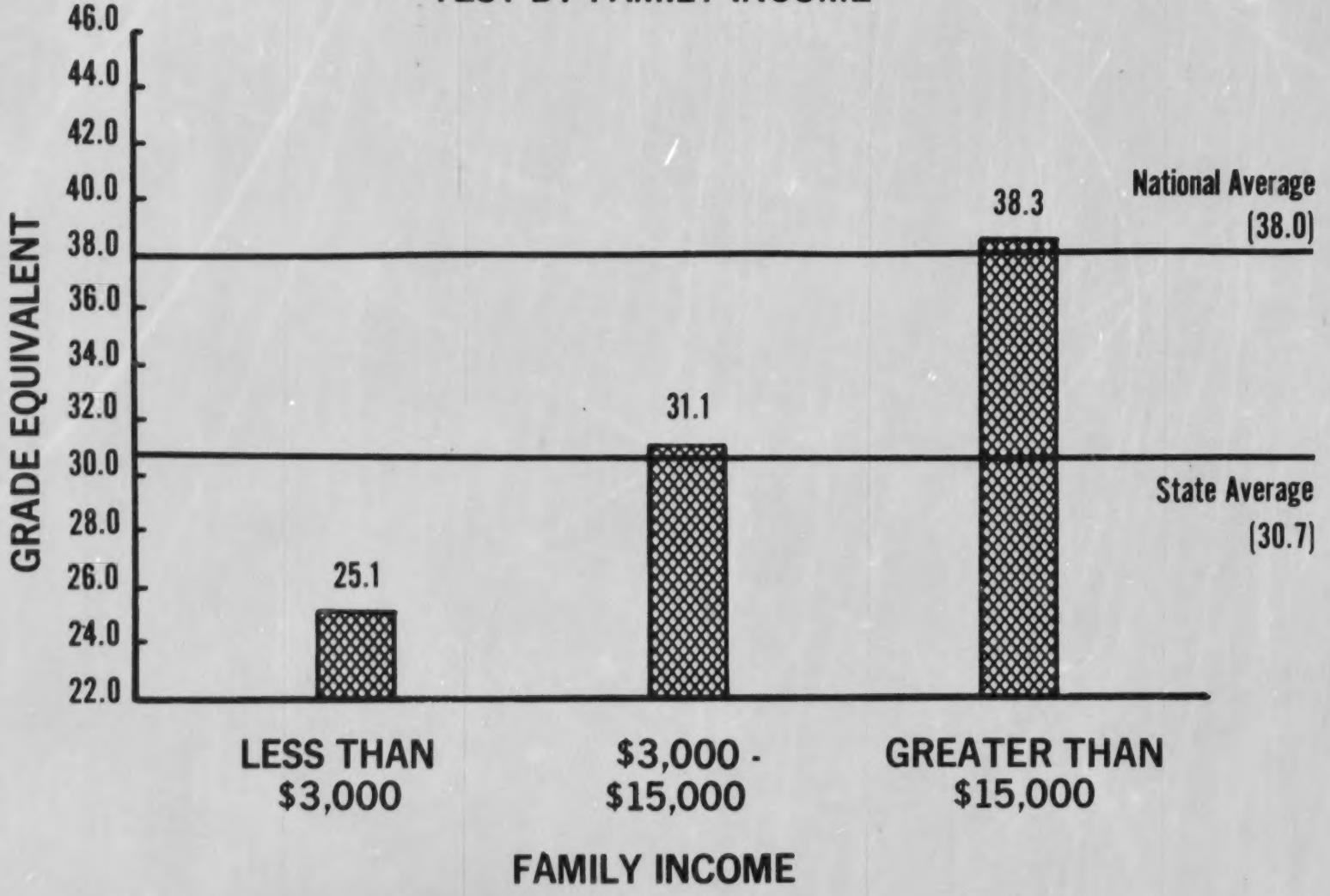

AVERAGES ON ITBS MATH PROBLEMS SUBTEST
BY EDUCATION LEVEL OF PARENTS
GRADE EQUIVALENT
46.0
44.0
42.0
40.0
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
20.0
26.2
28.3
32.4
36.5
National Average
(38.0)
State Average
(31.4)
BOTH PARENTS LESS THAN 8TH GRADE (1)
AT LEAST ONE PARENT MORE THAN 8TH GRADE BUT LESS THAN HIGH SCHOOL (2)
AT LEAST ONE PARENT FINISHED HIGH SCHOOL (3)
AT LEAST ONE PARENT SOME EDUCATION AFTER HIGH SCHOOL (4)
EDUCATION LEVEL OF PARENTS

AVERAGES ON ITBS MATH CONCEPTS SUBTEST BY EDUCATION LEVEL OF PARENTS



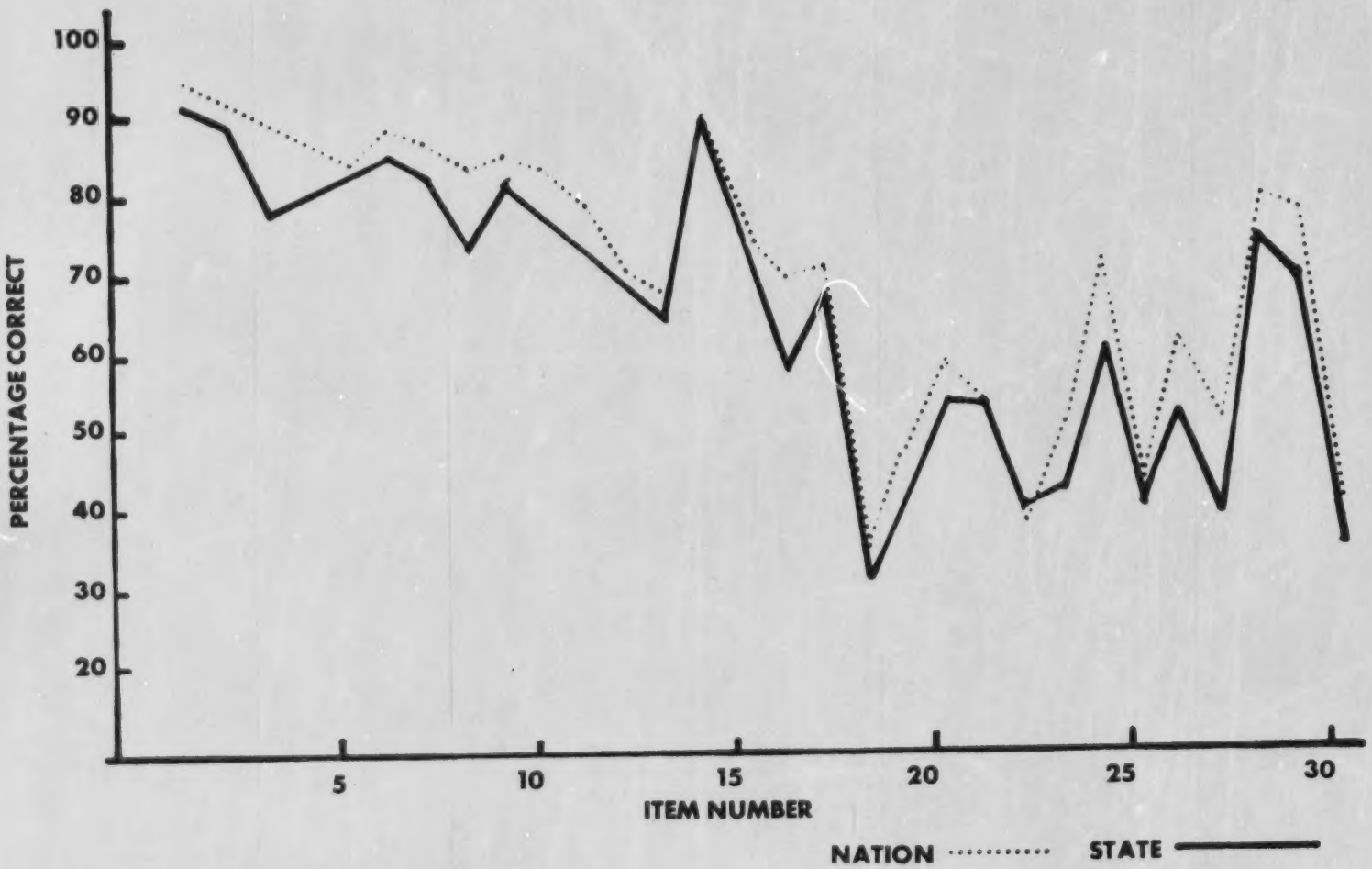

AVERAGES ON ITBS MATH
TOTAL BY FAMILY INCOME
GRADE EQUIVALENT
46.0
44.0
42.0
40.0
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
25.6
31.5
38.6
National Average
(38.0)
State Average
(31.1)
LESS THAN
$3,000
$3,000 -
$15,000
GREATER THAN
$15,000
FAMILY INCOME


AVERAGES ON ITBS MATH PROBLEMS TEST
BY FAMILY INCOME
GRADE EQUIVALENT
46.0
44.0
42.0
40.0
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
26.0
31.7
38.8
National Average
(38.0)
State Average
(31.4)
LESS THAN
$3,000
$3,000 -
$15,000
GREATER THAN
$15,000
FAMILY INCOME

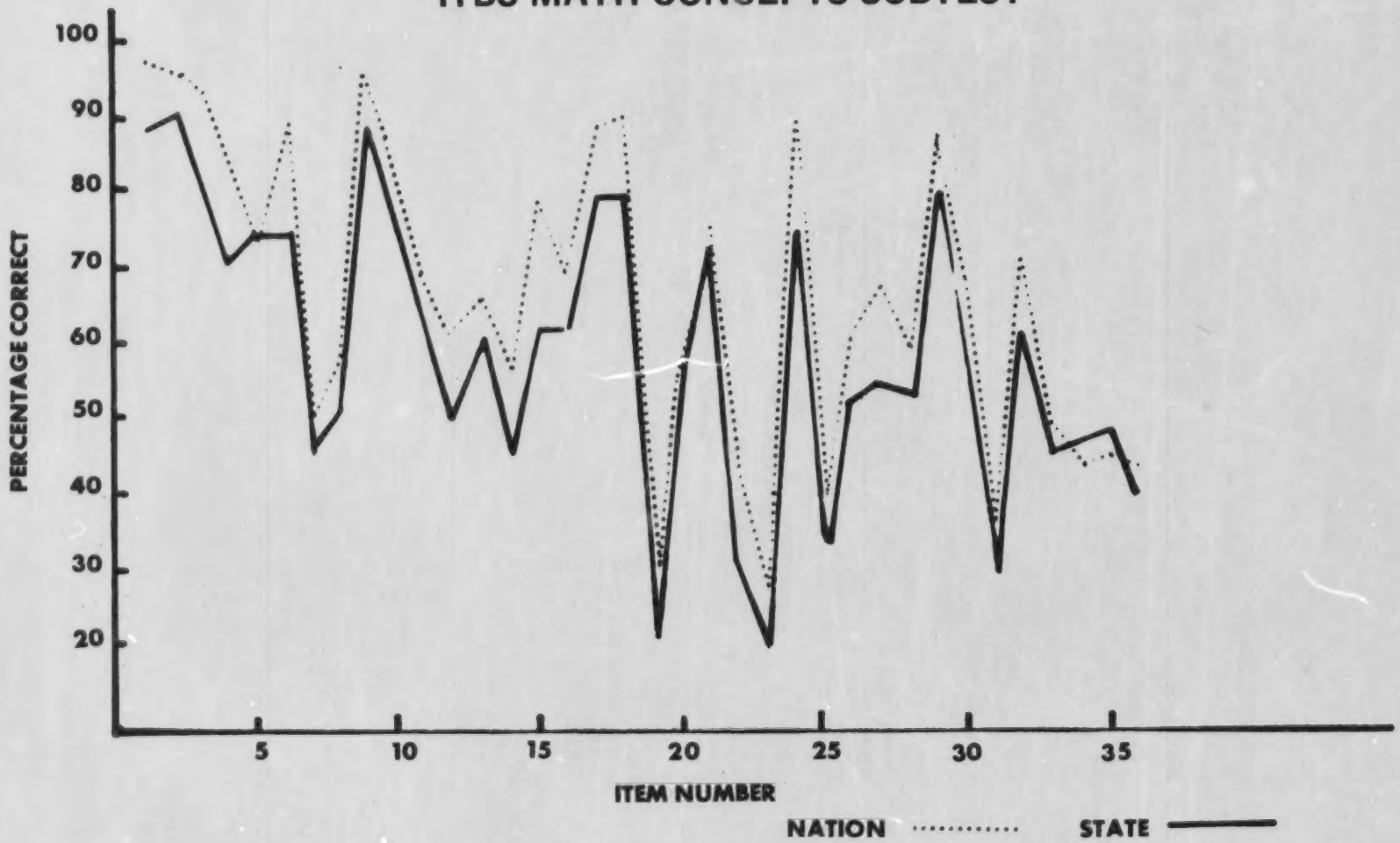

AVERAGES ON ITBS MATH CONCEPT
TEST BY FAMILY INCOME
GRADE EQUIVALENT
46.0
44.0
42.0
40.0
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
25.1
31.1
38.3
National Average
(38.0)
State Average
(30.7)
LESS THAN
$3,000
$3,000 -
$15,000
GREATER THAN
$15,000
FAMILY INCOME

APPENDIX B

STATE AND NATIONAL ITEM PERCENTAGE CORRECT PROFILE
ITBS MATH PROBLEMS SUBTEST



STATE AND NATIONAL ITEM PERCENTAGE CORRECT PROFILE
ITBS MATH CONCEPTS SUBTEST



APPENDIX C

TEACHERS' RATING OF MATHEMATICS ASSESSMENT OBJECTIVES
FOR SCORE MATH TEST

Instructions

The third-grade Mathematics Test in the 1973-74 State Assessment of Educational Progress included objectives not adequately measured by the standardized test that was given. Twenty intermediate or more general objectives were identified, and one or more instructional or student-performance objectives were selected for each intermediate objective. Each intermediate objective is identified by a Roman numeral; its instructional objective(s) is (are) numbered consecutively after it.

You are requested to rate each of the objectives (both intermediate and instructional) for three areas of concern: Importance, Being Taught, District Curriculum. There are three rating columns, one for each area. Circle one number in each column which best reflects your thinking.

Column A, Importance

In this column you should rate the objective for its overall importance to third-grade students. Is it important for these students to know or to be able to do? Does it reflect an important learning skill for them? You should judge here on the general importance of the objective and not whether it is currently being taught. Circle one number.

1. Very Important
2. Somewhat Important
3. Not Very Important

Column B, Being Taught:

Here you are asked to rate the objective as to whether it is being taught to your students. That is, do you teach to this objective? If you are a member of a team teaching situation and do not teach this particular subject, please make a judgment as to whether other team teachers teach to this objective. (This will help us to know if the objectives selected are ones that the students in North Carolina generally encounter.) Circle one number.

1. Yes, I (or team member) teach to this objective.
2. This objective is not specifically covered with my students, but they have highly similar content and activities.
3. No, my students are not taught this objective.

Column C, District Curriculum: This rating asks for your best judgment as to whether this objective is generally covered in the curriculum throughout your local school system. Thus, you might teach an objective which few others teach and would mark "No." Or you might not teach a particular objective which many others might teach and would mark "Yes." This rating is, of course, very subjective, and the results will be considered only as general indicators. Circle one number.

1. Yes, this objective is generally taught.
2. No, this objective is not generally taught.
3. I do not know.

The numbers in the rating columns have headings only on the first page of the questionnaire. In order to keep in mind the meaning of each number, refer back to the instructions (which may be separated from the questionnaire if desired) or the front page of the questionnaire.

MATHEMATICS ASSESSMENT OBJECTIVES

Objectives	(A) Importance Very Imp. / Somewhat Imp. / Not Very Imp. / Blank	(B) Being Taught Yes, Taught Similar Obj. / No, Not Taught / Blank	(C) District Curriculum Yes, Generally / No, Not Gen. / I Don't Know / Blank
I. The student will be able to identify sets, set membership.	1 2 3 83 10 7	1 2 3 93 7	1 2 3 93 2 5
a) The student will be able to identify in a pictorial representation which includes both objects in a set and objects that are not in the set, those objects that are members of the set.	1 2 3 81 17 2	1 2 3 95 3 2	1 2 3 93 3 2 2
II. The student will demonstrate an understanding of the concept of number.	1 2 3 98 2	1 2 3 98 2	1 2 3 98 2
a) The student will be able to identify the position in space or time of a particular object by naming the corresponding ordinal number.	1 2 3 88 12	1 2 3 90 10	1 2 3 98 2
III. The student will be able to read, write, and identify numerals.	1 2 3 100	1 2 3 100	1 2 3 100

Objectives	(A) Importance	(B) Being Taught	(C) District Curriculum
a) The student will be able to write the numeral for a whole number given orally.	1 2 3 B 95 5	1 2 3 B 98 2	1 2 3 B 98 2
b) The student will be able to write a fraction for the rational number associated with a model of halves, thirds or fourths.	1 2 3 74 24 2	1 2 3 81 17 2	1 2 3 79 9 12
c) The student will be able to write a fraction for the rational number associated with a model of sevenths, eighths or tenths.	1 2 3 36 45 19	1 2 3 38 29 33	1 2 3 41 26 33
IV. The student will demonstrate an understanding of regrouping and the use of expanded notation.	1 2 3 83 14 3	1 2 3 88 12	1 2 3 81 7 12
a) The student will be able to write a four-digit number in expanded notation.	1 2 3 64 31 5	1 2 3 79 12 9	1 2 3 74 9 17
V. The student will demonstrate an understanding of the decimal numeration system (place value).	1 2 3 86 12 2	1 2 3 86 9 5	1 2 3 83 3 14
a) The student will demonstrate a knowledge of place value by identifying place values in four-digit numerals.	1 2 3 81 19	1 2 3 83 14 3	1 2 3 86 7 7

Objectives	(A) Importance	(B) Being Taught	District (C) Curriculum
VI. The student will demonstrate a knowledge that there are many names for the same number.	1 2 3 B 81 17 2	1 2 3 B 76 19 2 3	1 2 3 B 79 7 12 2
a) The student will demonstrate a knowledge that many different combinations of numerals added together can equal the same specific number by selecting a combination of numerals that would be the same as a specified number.	1 2 3 74 26	1 2 3 79 21	1 2 3 76 14 10
b) The student will be able to write different numerals which when added together or subtracted from each other give an indicated number.	1 2 3 71 26 3	1 2 3 76 24	1 2 3 81 14 5
VII. The student will demonstrate an understanding of the order property of whole numbers.	1 2 3 95 5	1 2 3 93 7	1 2 3 91 7 2
a) The student will be able to put groups of 1 to 10 objects in order from the largest to the smallest and from the smallest to the largest.	1 2 3 98 2	1 2 3 98 2	1 2 3 98 2
b) The student will be able to arrange five different counting numbers less than 1000 in order from smallest to largest.	1 2 3 81 16 2	1 2 3 83 14 3	1 2 3 71 19 10

Objectives	(A) Importance	(B) Being Taught	(C) District Curriculum
c) The student will be able to identify a number as being greater than, equal to, or less than a second number.	1 2 3 B 95 5	1 2 3 B 95 5	1 2 3 B 95 5
VIII. The student will demonstrate an understanding of the theory of multiples.	1 2 3 71 24 5	1 2 3 74 19 2 5	1 2 3 79 9 7 5
a) The student will be able to count the elements of a nonempty set by twos, fives, tens, etc., to determine the number of elements in the set.	1 2 3 83 14 3	1 2 3 86 9 5	1 2 3 81 5 9 5
b) The student will demonstrate a knowledge of skip counting by skip counting by 3, 5, 10, 100, 1000.	1 2 3 64 33 3	1 2 3 76 21 3	1 2 3 69 17 14
c) The student will be able to supply missing multiples in an incomplete sequence of multiples.	1 2 3 69 29 2	1 2 3 74 24 2	1 2 3 69 14 17
IX. The student will demonstrate an understanding of properties of addition and subtraction.	1 2 3 100	1 2 3 100	1 2 3 95 3 2

Objectives	(A) Importance	(B) Being Taught	(C) District Curriculum
a) The student will be able to write the related subtraction equation for a two-number addition equation with a missing addend.	1 2 3 B 83 17	1 2 3 B 79 21	1 2 3 B 86 5 7 2
X. The student will demonstrate an understanding of the properties of multiplication and division.	1 2 3 93 7	1 2 3 86 14	1 2 3 83 12 5
a) The student will apply the knowledge that multiplication makes an answer have a larger number and whole number division makes an answer have a smaller number, by being able to select either the multiplication or division signs which would belong in a specified problem.	1 2 3 74 26	1 2 3 69 29 2	1 2 3 67 14 19
XI. The student will demonstrate an ability to add whole numbers with two or more digits.	1 2 3 98 2	1 2 3 98 2	1 2 3 98 2
a) The student will be able to add two one-, two-, three-, or four-digit numerals with no regrouping.	1 2 3 95 5	1 2 3 95 5	1 2 3 95 5
b) The student will be able to write the sum of an addition problem with two addends of three- or four-digit numbers.	1 2 3 91 9	1 2 3 93 7	1 2 3 93 7

Objectives	(A) Importance	(B) Being Taught	(C) District Curriculum
XII. The student will demonstrate an ability to solve subtraction problems with two or more digits.	1 2 3 B 98 2	1 2 3 B 95 5	1 2 3 B 93 7
a) The student will be able to subtract a two- or three-digit number from a three-digit number with regrouping.	1 2 3 93 7	1 2 3 93 7	1 2 3 86 9 5
b) The student will be able to find the difference of two one-, two-, three-, or four-digit numerals with no regrouping.	1 2 3 95 5	1 2 3 95 5	1 2 3 95 5
c) The student will be able to check a two-digit subtraction equation by adding the remainder to the subtrahend.	1 2 3 91 9	1 2 3 91 9	1 2 3 81 7 12
XIII. The student will demonstrate an understanding of measurement involving the United States monetary system.	1 2 3 95 5	1 2 3 95 5	1 2 3 93 2 5
a) The student will be able to indicate the value of a given group of pennies, nickels, and dimes that total less than $1.00.	1 2 3 98 2	1 2 3 98 2	1 2 3 98 2

Objectives	(A) Importance	(B) Being Taught	District (C) Curriculum
b) The student will be able to state the amount of change he should receive after the purchase of an article when given the price and the amount of money paid.	1 2 3 B 95 5	1 2 3 B 93 7	1 2 3 B 91 7 2
XIV. The student will demonstrate an understanding of the measurement of time.	1 2 3 98 2	1 2 3 95 5	1 2 3 91 5 4
a) The student will state the time shown on a clock face to the nearest minute.	1 2 3 86 14	1 2 3 91 7 2	1 2 3 86 5 9
XV. The student will demonstrate an understanding of the English system of measurement.	1 2 3 83 14 1	1 2 3 79 17 2 2	1 2 3 83 12 3
a) The student will be able to measure an object to the nearest inch using a twelve-inch ruler marked with fractions of inches.	1 2 3 86 14	1 2 3 76 24	1 2 3 81 17 2
XVI. The student will demonstrate an understanding of geometric figures and their properties.	1 2 3 53 45 2	1 2 3 67 26 7	1 2 3 64 12 24
a) The student will draw a closed curve with the points on, inside, and outside the curve.	1 2 3 43 48 9	1 2 3 55 29 16	1 2 3 53 21 26

Objectives	(A) Importance	(B) Being Taught	District (C) Curriculum
XVII. The student will demonstrate an ability to make geometric drawings and constructions.	1 2 3 B 74 24 2	1 2 3 B 81 14 5	1 2 3 B 83 3 14
a) The student will be able to make rough drawings of circles, squares, rectangles, triangles, and line segments.	1 2 3 79 21	1 2 3 86 12 2	1 2 3 81 5 14
XVIII. The student will demonstrate an ability to compute the area of geometric figures.	1 2 3 41 43 14 2	1 2 3 48 26 24 2	1 2 3 41 17 40 2
a) The student will be able to state the number of square units contained in a region on a square unit grid.	1 2 3 40 48 12	1 2 3 52 26 21	1 2 3 43 19 38
XIX. The student will demonstrate an ability to interpret graphs and tables.	1 2 3 57 36 7	1 2 3 52 36 12	1 2 3 48 9 43
a) The student will be able to answer questions related to a bar graph.	1 2 3 57 31 12	1 2 3 62 24 14	1 2 3 45 17 38

Objectives	(A) Importance	(B) Being Taught	District (C) Curriculum
XX. The student will demonstrate an ability to analyze number sentences to determine their truth and appropriateness.	1 2 3 B 71 26 2	1 2 3 B 74 24 2	1 2 3 B 67 14 19
a) The student will be able to indicate the proper relationship by supplying the correct symbol in a closed mathematical sentence with a missing order symbol.	1 2 3 76 19 5	1 2 3 74 19 7	1 2 3 67 7 26

TEACHERS RATING OF OBJECTIVE-ITEM
CONGRUENCE AND ITEM DIFFICULTY
FOR SCORE MATH TEST

Instructions

In this questionnaire you are asked to look at each item on the Math Test and make a judgment about how well it seems to measure the objective for which it is listed. Two types of ratings are requested: one dealing with how well you think the item measures the objective with which it is listed, and the second dealing with how difficult you think the item would be for your students.

Column A, Measure: Here you are to judge the excellence of the item as a measure of the objective listed. Circle the number that best reflects your own opinion.

1. A very good measure of the stated objective
2. An adequate or generally acceptable measure of the objective
3. A poor measure of the stated objective

Column B, Difficulty: Please rate each item on its difficulty level or on what percentage of third-grade students you have taught which you think would pass that item in the spring. Ratings range from "1" (Very Difficult) to "5" (Very Easy). In order for the responses from all the raters to be comparable, please use the following guidelines for ranking each item. The percentages represent the number of your students you believe could answer the item correctly.

1. 0-20% answer correctly
2. 21-40% answer correctly
3. 41-60% answer correctly
4. 61-80% answer correctly
5. 81-100% answer correctly

Below each objective, the item(s) measuring that objective is (are) listed. You must refer to that item number in the enclosed Math Test booklet. In order to completely understand some of the math items, the instructions for the test administrator are also necessary. Therefore, we have combined the administrator instructions with the test items so you only have to refer to one booklet. For example, items one and three are measures of the first objective listed. You should turn first to item number one in the test booklet and read the item completely. After completing the item, rate it on the two scales described above: Measure and Difficulty. Then do the same for item number three. Follow this procedure for the items listed for each objective.

The test items are generally boxed in to separate them from any administrator's instructions. When reviewing the items, keep in mind that all items were read aloud to the students in order to reduce the influence of poor reading on the ability to answer.

You may refer back to these instructions if necessary in order to keep the rating scales in mind. If helpful, you may separate this sheet of instructions from the rating questionnaire itself.

ITEM RATING SCALE

Objectives	Item	1-Good 2-Adequate 3-Poor A Measure	1: 0-20% 2: 21-40% 3: 41-60% 4: 61-80% 5: 81-100% B Difficulty
I. The student will be able to identify sets, set membership.			
The student will be able to identify in a pictorial representation which includes both objects in a set and objects that are not in the set, those objects that are members of the set.	1	1 2 3 76 24	1 2 3 4 5 7 21 36 37
	3	1 2 3 81 19	1 2 3 4 5 7 14 33 45
II. The student will demonstrate an understanding of the concept of number.			
The student will be able to identify the position in space or time of a particular object by naming the corresponding ordinal number.	6	1 2 3 64 29 7	1 2 3 4 5 7 12 24 29 29
	19	1 2 3 86 14	1 2 3 4 5 2 2 19 36 41
III. The student will be able to read, write, and identify numerals.			
The student will be able to write the number given orally.	50	1 2 3 86 10 5	1 2 3 4 5 5 5 5 10 76
The student will be able to write a fraction for the rational number associated with a model of halves, thirds or fourths.	23	1 2 3 67 26 7	1 2 3 4 5 7 26 31 31 5
The student will be able to write a fraction for the rational number associated with a model of sevenths, eighths, or tenths.	18	1 2 3 76 19 5	1 2 3 4 5 12 17 32 17 12
	22	1 2 3 71 27 2	1 2 3 4 5 17 41 21 14 7
IV. The student will demonstrate an understanding of regrouping and the use of expanded notation.			

Objectives	Item	1-Good 2-Adequate 3-Poor A Measure	1: 0-20% 2: 21-40% 3: 41-60% 4: 61-80% 5: 81-100% B Difficulty
The student will be able to write a four-digit number in expanded notation.	49	1 2 3 57 29 14	1 2 3 4 5 21 21 21 29 7
V. The student will demonstrate an understanding of the decimal numeration system (place value).			
The student will demonstrate a knowledge of place value by identifying place values in four-digit numerals.	44	1 2 3 67 31 2	1 2 3 4 5 12 21 17 33 17
	47	1 2 3 64 29 2	1 2 3 4 5 7 27 17 24 24
VI. The student will demonstrate a knowledge that there are many names for the same number.			
The student will demonstrate a knowledge that many different combinations of numerals added together can equal the same specific number by selecting a combination of numerals that would be the same as a specified number.	43	1 2 3 83 14 2	1 2 3 4 5 2 2 14 29 52
	46	1 2 3 86 12 2	1 2 3 4 5 2 5 21 21 50
The student will be able to write different numerals which when added together or subtracted from each other give an indicated number.	42	1 2 3 50 38 12	1 2 3 4 5 17 24 29 24 7
	45	1 2 3 51 39 10	1 2 3 4 5 12 27 24 20 17
VII. The student will demonstrate an understanding of the order property of whole numbers.			
The student will be able to put groups of 1 to 10 objects in order from the largest to the smallest and from the smallest to the largest.	7	1 2 3 62 31 7	1 2 3 4 5 5 2 21 26 45

Objectives	Item	1-Good 2-Adequate 3-Poor A Measure	1: 0-20% 2: 21-40% 3: 41-60% 4: 61-80% 5: 81-100% B Difficulty
The student will be able to identify a number as being greater than, equal to, or less than a second number.	53	1 2 3 79 14 7	1 2 3 4 5 5 10 14 29 43
	54	1 2 3 74 19 7	1 2 3 4 5 2 5 24 26 43
VIII. The student will demonstrate an understanding of the theory of multiples.			
The student will be able to count the elements of a non-empty set by twos, fives, tens, etc., to determine the number of elements in the set.	12	1 2 3 83 17	1 2 3 4 5 5 17 36 43
	14	1 2 3 88 12	1 2 3 4 5 2 14 31 52
The student will demonstrate a knowledge of skip counting by skip counting by 3, 5, 10, 100, 1000.	27	1 2 3 88 12	1 2 3 4 5 5 19 29 48
	41	1 2 3 86 14	1 2 3 4 5 5 17 17 62
The student will be able to supply missing multiples in an incomplete sequence of multiples.	40	1 2 3 85 15	1 2 3 4 5 8 23 30 18
	51	1 2 3 93 7	1 2 3 4 5 5 17 24 54
IX. The student will demonstrate and understanding of properties of addition and subtraction.			
The student will be able to write the related subtraction equation for a two-number addition equation with a missing addend.	39	1 2 3 69 24 7	1 2 3 4 5 7 14 31 29 19
X. The student will demonstrate an understanding of the properties of miltiplication and division.			

Objectives	Item	1-Good 2-Adequate 3-Poor	1: 0-20% 2: 21-40% 3: 41-60% 4: 61-80% 5: 81-100%
		A Measure	B Difficulty
The student will apply the knowledge that multiplication makes an answer have a larger number and whole number division makes an answer have a smaller number, by being able to select either the multiplication or division signs which would belong in a specified problem	37	1 2 3 86 14	1 2 3 4 5 7 26 41 26
	38	1 2 3 86 14	1 2 3 4 5 7 24 43 26
XI. The student will demonstrate an ability to add whole numbers with two or more digits.			
The student will be able to add two one-, two-, three-, or four-digit numerals with no regrouping.	32	1 2 3 93 7	1 2 3 4 5 2 12 21 64
	36	1 2 3 93 7	1 2 3 4 5 2 7 24 67
The student will be able to write the sum of an addition problem with two addends of three- or four-digit numbers.	31	1 2 3 93 7	1 2 3 4 5 7 12 33 52
	35	1 2 3 91 10	1 2 3 4 5 12 41 31 17
XII. The student will demonstrate an ability to solve subtraction problems with two or more digits.			
The student will be able to subtract a two- or three-digit number from a three-digit number with regrouping.	30	1 2 3 83 14 2	1 2 3 4 5 14 41 31 14
	34	1 2 3 83 17	1 2 3 4 5 12 41 26 21
The student will be able to find the difference of two one-, two-, three-, and four-digit numerals with no regrouping.	2	1 2 3 90 10	1 2 3 4 5 3 3 36 59
	33	1 2 3 86 14	1 2 3 4 5 2 7 36 55
The student will be able to check a two-digit subtraction equation by adding the remainder to the subtrahend.	26	1 2 3 83 17	1 2 3 4 5 7 34 37 22
	29	1 2 3 79 21	1 2 3 4 5 16 36 43 5

Objectives	Item	1-Good 2-Adequate 3-Poor A Measure	1: 0-20% 2: 21-40% 3: 41-60% 4: 61-80% 5: 81-100% B Difficulty
XIII. The student will demonstrate an understanding of measurement involving the United States monetary system.			
The student will be able to indicate the value of a given group of pennies, nickels, and dimes that total less than $1.00.	13	1 2 3 64 33 2	1 2 3 4 5 12 24 38 26
	20	1 2 3 66 32 2	1 2 3 4 5 10 29 38 24
XIV. The student will demonstrate an understanding of the measurement of time.			
The student will state the time shown on a clock face to the nearest minute.	10	1 2 3 79 19 2	1 2 3 4 5 14 43 38 5
XV. The student will demonstrate an understanding of the English System of measurement.			
The student will be able to measure an object to the nearest inch using a twelve-inch ruler marked with fractions of inches.	4	1 2 3 88 12	1 2 3 4 5 2 5 24 41 29
XVI. The student will demonstrate an understanding of geometric figures and their properties.			
The student will draw a closed curve with the point on, inside, and outside the curve.	5	1 2 3 64 29 7	1 2 3 4 5 10 21 26 29 14
XVII. The student will demonstrate an ability to make geometric drawings and constructions.			

Objectives	Item	1-Good 2-Adequate 3-Poor	1: 0-20% 2: 21-40% 3: 41-60% 4: 61-80% 5: 81-100%
		A Measure	B Difficulty
The student will be able to make rough drawings of circles, squares, rectangles, triangles, and line segments.	16	1 2 3 76 19 5	1 2 3 4 5 7 10 26 57
	17	1 2 3 76 19 5	1 2 3 4 5 5 2 17 76
XVIII. The student will demonstrate an ability to compute the area of geometric figures.			
The student will be able to state the number of square units contained in a region of a square unit grid.	8	1 2 3 86 14	1 2 3 4 5 7 21 71
	15	1 2 3 86 14	1 2 3 4 5 10 33 57
XIX. The student will demonstrate an ability to interpret graphs and tables.			
The student will be able to answer questions related to a bar graph.	9	1 2 3 74 26	1 2 3 4 5 5 12 26 36 21
	11	1 2 3 77 23	1 2 3 4 5 5 10 23 33 28
XX. The student will demonstrate an ability to analyze number sentences to determine their truth and appropriateness.			
The student will be able to indicate the proper relationship by supplying the correct symbol in a closed mathematical sentence with a missing order symbol.	48	1 2 3 74 26	1 2 3 4 5 10 12 26 41 12
	52	1 2 3 71 29	1 2 3 4 5 5 10 10 38 38

SUMMARY DATA OF SCORE MATHEMATICS ACHIEVEMENT AND
TEACHER RATINGS ON SCORE MATHEMATICS ASSESSMENT OBJECTIVES

Objective	Percent of Teachers Reporting							
	Objective Important For Third Grade Students			Objective Being Taught In Their Classroom	Objective Generally Taught In Their School District	Item(s) Either Good Or Adequate Measure Of Objective	Two Thirds Of Their Students Would Respond Correctly	Percent of Students Correctly Responding To Item(s)
	Very Imp.	Somewhat Imp.	Total					
MEASUREMENT								
U. S. Monetary System	97	3	100	97	95	97	58	71
Time	98	2	100	95	91	98	43	62
Length	83	14	97	79	83	100	70	81
NUMBER SEQUENCES								
Operational Symbols	74	26	100	69	67	100	68	86
Equalities	85	12	97	84	81	96	64	83
Inequalities	83	15	98	84	81	95	61	45
FRACTIONS								
Part of a Whole (halves, thirds, fourths)	55	34	89	60	60	95	28	41
(sevenths, eights, tenths)	74	24	98	81	79	93	36	47
NON-METRIC GEOMETRY	36	45	81	38	41	96	25	38
Figures and Properties	65	31	96	74	72	94	73	87
METRIC GEOMETRY								
Areas	42	46	88	50	42	100	92	96
GRAPHS	57	34	91	57	47	100	59	90

SUMMARY DATA OF SCORE MATHEMATICS ACHIEVEMENT AND

TEACHER RATINGS ON SCORE MATHEMATICS ASSESSMENT OBJECTIVES (CONTINUED)

Objective	Percent of Teachers Reporting							Percent of Students Correctly Responding To Item(s)
	Objective Important For Third Grade Students			Objective Being Taught In Their Classroom	Objective Generally Taught In Their School District	Item(s) Either Good or Adequate Measure of Objective	Two Thirds Of Their Students Would Respond Correctly	
	Very Imp.	Somewhat Imp.	Total					
NUMERATION AND NUMBER SYSTEM								
Number/Numeral Distinction	72	26	98	78	79	93	73	65
(Addition)	74	26	100	79	76	98	76	83
(Addition/Subtraction)	71	26	97	76	81	89	67	47
Counting by Multiples	72	24	96	78	74	100	77	86
ORDINALS								
Position	94	2	96	95	98	95	68	75
Order Property	81	16	97	83	71	100	57	70
Place Value and Expanded Notation	79	19	98	84	81	92	45	49
Number Sequence	69	29	98	74	69	99	73	76
SETS	82	14	96	94	93	100	76	90
READING AND WRITING NUMERALS	95	5	100	98	98	96	86	90
FUNDAMENTAL OPERATIONS								
Properties	91	8	99	90	91	93	48	34

SUMMARY DATA OF SCORE MATHEMATICS ACHIEVEMENT AND

TEACHER RATINGS ON SCORE MATHEMATICS ASSESSMENT OBJECTIVES (CONTINUED)

Objective	Percent of Teachers Reporting							
	Objective Important For Third Grade Students			Objective Being Taught In Their Classroom	Objective Generally Taught In Their School District	Item(s) Either Good or Adequate Measure of Objective	Two Thirds Of Their Students Would Respond Correctly	Percent of Students Correctly Responding To Item(s)
	Very Imp.	Somewhat Imp.	Total					
ADDITION								
Three and Four-Digit Addends With No Regrouping	97	3	100	97	97	100	88	84
Three and Four-Digit Addends With Regrouping	91	9	100	93	93	100	66	65
SUBTRACTION								
Three and Four-Digit Addends With No Regrouping	93	7	100	93	86	98	46	47
Subtraction Checked By Addition	91	9	100	91	81	99	54	42

SCORE MATH OBJECTIVE CLUSTERS

Cluster One

Operational Symbols
Counting by Multiples
Sets
Reading and Writing Numerals
Addition (Three- and Four-Digit Addends With No Regrouping)
Measurement (Length)

Cluster Two

Measurement (U. S. Monetary System)
Equalities
Number/Numeral Distinction Involving One Operation
Ordinals (Position)
Number Sequence
Subtraction (Three- and Four-Digit Addends With No Regrouping)

Cluster Three

Non-Metric Geometry
Metric Geometry
Graphs

Cluster Four

Measurement (Time)
Addition (Three- and Four-Digit Addends With Regrouping)
Subtraction (Three- and Four-Digit Addends With Regrouping)
Subtraction Checked by Addition
Properties of Fundamental Operations
Place Value and Expanded Notation
Inequalities
Fractions (Halves, Thirds, Fourths)
Number/Numeral Distinction Involving Two Operations
Ordinals (Order Property)

Cluster Five

Fractions (Sevenths, Eighths, Tenths)

APPENDIX D

EXPLANATION OF TABLE ENTITLED, "PERCENTAGE OF STUDENTS CORRECTLY RESPONDING TO VARIOUS NUMBERS OF ITEMS WITHIN EACH OBJECTIVE ON MATH TEST"

The following table presents the percentages of students correctly responding to various numbers of items measuring each of the 26 objectives on the SCORE Mathematics Test. Analysis of these percentages reveals approximately how well North Carolina's third grade students have achieved basic mathematics skills. Results are shown on the table according to the following classifications: state, region (Coastal Plains, Piedmont, Mountain), race by sex (black male, black female, white male, white female), family income (high, middle, low), and parental education level (1, 2, 3, 4).

However, several cautions are needed for interpreting this information. (1) It is important to keep in mind the method used to construct an objective-based test. (2) It is crucial to know whether a given objective is considered important for North Carolina's students. (3) The percentages reported should not be confused in any way with a grading scale; i.e., a 70 percent figure does not imply a pass or fail point. (4) There is no constant mastery level used here for all objectives due to the arbitrary nature of such a mastery level, the differing number of items used to measure various objectives, and the heterogeneity of North Carolina's student population.

To further clarify these concepts, two examples of objective achievement data interpretation are presented.

For Objective 1, 97 percent of North Carolina's students correctly

responded to at least one of the four items designed to measure this objective; 88 percent correctly responded to at least two; 67 percent to at least three, while 29 percent correctly answered all four. Do these figures imply that North Carolina's students did or did not perform satisfactorily in relation to this objective?

Since almost 90 percent of North Carolina's third grade sample correctly answered half of the items of Objective 1 and over two-thirds of the students correctly responded to three out of four of the items, North Carolina's students demonstrated a high degree of achievement on this objective.

For Objective 6, 74 percent of the students answered at least one of two items correctly, but only 16 percent correctly answered both of the items. North Carolina's students performed less than satisfactorily on this objective.

These two examples, plus the following achievement data summary should aid the interpretation of the tables found on the following pages.

STATE SUMMARY OF OBJECTIVE ACHIEVEMENT DATA

I. Objectives judged to be satisfactorily achieved by North Carolina's third graders:

1, 3, 4, 5, 9, 10, 11, 12, 14, 15, 18, 19, 20, 22, 24

II. Objectives judged to be unsatisfactorily achieved by North Carolina's third graders:

2, 6, 7, 8, 13, 16, 17, 21, 23, 25, 26

Percentage of Students Correctly Responding to Various Numbers of Items within Each Objective on Math Test

Objective	# Items Correct	State	Region			Race By Sex				Family Inc.			Parent's Ed.			
			C.P.	Pied.	Mtn.	BM	BF	WM	WF	H	M	L	1	2	3	4
1 Factual and computational knowledge of U.S. monetary system	= 0	3	4	3	1	5	5	1	3	1	3	6	7	5	2	1
	≥ 1	97	96	97	99	95	95	99	97	99	97	94	93	95	98	99
	≥ 2	88	85	87	95	80	81	92	91	98	89	79	83	85	89	95
	≥ 3	67	62	67	76	55	53	73	73	86	68	53	58	60	69	79
	= 4	29	25	30	37	19	21	34	33	50	30	17	23	23	30	41
2 Telling Time	= 1	62	53	65	70	46	51	68	69	87	62	50	48	55	60	81
3 Factual knowledge and application of the English measurement system	= 1	81	78	81	87	73	70	88	83	92	83	69	75	75	83	87
4 Recognition and application of operational symbols	= 0	3	3	3	3	4	3	2	3	1	3	4	4	4	2	2
	≥ 1	97	97	97	97	96	96	98	97	99	97	96	96	96	98	98
	= 2	74	72	74	82	63	63	80	81	93	77	57	59	64	78	88
5 Recognition and application of the equality symbol	= 0	5	6	4	3	9	51	4	3	2	4	7	12	8	3	2
	≥ 1	95	94	96	97	91	94	96	97	98	96	93	88	92	97	98
	= 2	70	64	71	80	52	57	76	79	84	73	51	52	60	73	86

Percentage of Students Correctly Responding to Various Numbers of Items within Each Objective on Math Test (con't.)

Objective	# Items Correct	State	Region			Race By Sex				Family Inc.			Parent's Ed.			
			C.P.	Pied.	Mtn.	BM	BF	WM	WF	H	M	L	1	2	3	4
6 Recognition and application of the inequality symbols	= 0	26	28	26	21	35	37	20	22	12	24	41	47	32	24	14
	≥ 1	74	72	74	79	65	63	80	78	88	76	59	53	68	76	86
	= 2	16	15	16	18	11	11	19	18	32	16	11	9	13	15	28
7 Recognition of the fraction associated with sevenths, eighths, and tenths	= 0	51	52	51	50	59	57	49	47	35	51	58	58	57	52	39
	≥ 1	49	48	49	50	41	43	51	53	65	49	42	42	43	48	61
	= 2	26	23	27	31	16	19	29	31	51	26	17	13	18	26	43
8 Recognition of the fraction associated with halves, thirds and fourths	= 1	47	43	49	52	40	39	50	52	64	47	38	37	44	46	59

Percentage of Students Correctly Responding to Various Numbers of Items within Each Objective on Math Test (con't)

Objective	# Items Correct	State	Region			Race By Sex				Family Inc.			Parent's Ed.			
			C.P.	Pied.	Mtn.	BM	BF	WM	WF	H	M	L	1	2	3	4
9 Factual knowledge and application and construction of geometric figures and their properties	= 0	1	2	1	0	3	3	0	1	0	1	5	6	2	1	0
	≥ 1	99	98	99	100	97	97	100	99	100	99	95	94	98	99	100
	≥ 2	95	94	96	98	90	90	98	98	100	96	89	87	94	96	98
	= 3	67	62	69	69	54	51	72	76	87	68	52	51	57	69	80
10 Computation of geometric figures	= 0	1	0	1	0	1	1	0	0	0	0	1	2	1	0	0
	≥ 1	100	100	99	100	99	99	100	100	100	100	99	98	99	100	100
	= 2	92	92	91	96	88	88	94	94	96	93	88	87	91	94	95
11 Interpretation of graphs	= 0	4	5	3	3	7	7	2	2	0	3	8	10	7	2	1
	≥ 1	96	95	97	97	93	93	98	98	100	97	92	90	93	98	99
	= 2	82	80	83	87	67	73	88	89	96	85	67	65	74	88	92
12 Factual knowledge of equivalent numbers and their combination (one operation)	= 0	8	10	8	4	17	14	4	4	2	7	16	16	11	5	2
	≥ 1	92	90	92	96	83	86	96	96	98	93	84	84	89	95	98
	= 2	74	71	74	79	60	58	80	82	86	76	56	58	65	78	86

Percentage of Students Correctly Responding to Various Numbers of Items within Each Objective on Math Test (con't.)

Objective	# Items Correct	State	Region			Race By Sex				Family Inc.			Parent's Ed.			
			C.P.	Pied.	Mtn.	BM	BF	WM	WF	H	M	L	1	2	3	4
13 Factual knowledge of equivalent numbers and their combinations(two operations)	= 0	31	32	30	32	37	32	31	28	27	31	36	29	37	31	26
	≥ 1	69	68	70	68	63	68	69	72	73	70	64	71	63	69	74
	= 2	25	23	26	26	18	19	27	30	33	26	18	24	21	27	31
14 Counting by multiples	= 0	1	1	1	0	3	3	0	0	0		3	4	1	1	0
	≥ 1	99	99	99	100	97	97	100	100	100		97	96	100	99	100
	≥ 2	96	95	96	98	92	92	98	98	99	97	91	87	94	97	99
	≥ 3	89	85	90	94	80	79	94	95	97	91	77	77	82	93	97
	= 4	69	65	71	75	55	52	76	79	86	72	50	57	58	74	84
15 Application of the ordinal property of numbers	= 0	2	1	2	1	4	2	1	1	0	1	4	5	3	1	0
	≥ 1	98	99	98	99	96	98	99	99	100	99	96	95	97	99	100
	≥ 2	83	81	84	88	74	77	87	87	96	84	73	61	78	86	93
	= 3	44	36	47	51	31	34	48	51	67	44	31	27	34	45	61

Percentage of Students Correctly Responding to Various Numbers of Items within Each Objective on Math Test (con't.)

Objective	# Items Correct	State	Region			Race By Sex				Family Inc.			Parent's Ed.			
			C.P.	Pied.	Mtn.	BM	BF	WM	WF	H	M	L	1	2	3	4
16 Application of the order property of numbers	= 0	16	19	15	12	25	24	13	10	5	14	28	28	23	13	5
	≥ 1	84	81	85	88	75	76	87	90	95	86	72	72	77	87	95
	= 2	57	47	60	66	35	41	62	69	83	58	37	33	43	62	74
17 Factual knowledge of place value and expanded notation	= 0	16	19	15	11	21	24	13	12	7	15	23	23	18	14	10
	≥ 1	84	81	85	89	79	76	87	88	93	85	77	77	82	86	90
	≥ 2	49	45	49	60	36	37	55	55	62	51	36	40	41	52	60
	= 3	17	13	16	30	11	9	22	18	22	18	9	8	13	18	25
18 Replacing missing numbers in a number frequence	= 0	9	9	9	9	14	13	9	4	2	9	16	14	16	8	3
	≥ 1	91	91	91	91	86	87	91	96	98	91	84	86	84	92	97
	= 2	61	58	62	63	46	50	64	71	83	63	42	43	48	65	76

Percentage of Students Correctly Responding to Various Numbers of Items within Each Objective on Math Test (con't)

Objective	# Items Correct	State	Region			Race By Sex				Family Inc.			Parent's Ed.			
			C.P.	Pied.	Mtn.	BM	BF	WM	WF	H	M	L	1	2	3	4
19 Identification of sets	= 0	4	4	4	3	10	6	2	2	2	3	10	12	6	3	1
	≥ 1	96	96	96	97	90	94	98	98	98	97	90	88	94	97	99
	= 2	83	82	83	86	71	73	88	90	94	86	69	67	78	84	94
20 Recognition of numerals	= 1	90	87	90	97	82	79	95	94	97	92	77	77	84	93	96
21 Factual knowledge of the properties of fundamental operations	= 1	34	32	35	37	32	30	39	32	46	33	32	26	25	36	41
22 Computation - addition of three and four digit addends with no regrouping	= 0	8	9	7	6	13	12	7	4	3	6	18	17	10	6	3
	≥ 1	92	91	93	94	87	88	93	96	97	94	82	83	90	94	97
	= 2	74	72	75	78	64	65	75	84	83	77	60	52	70	78	83

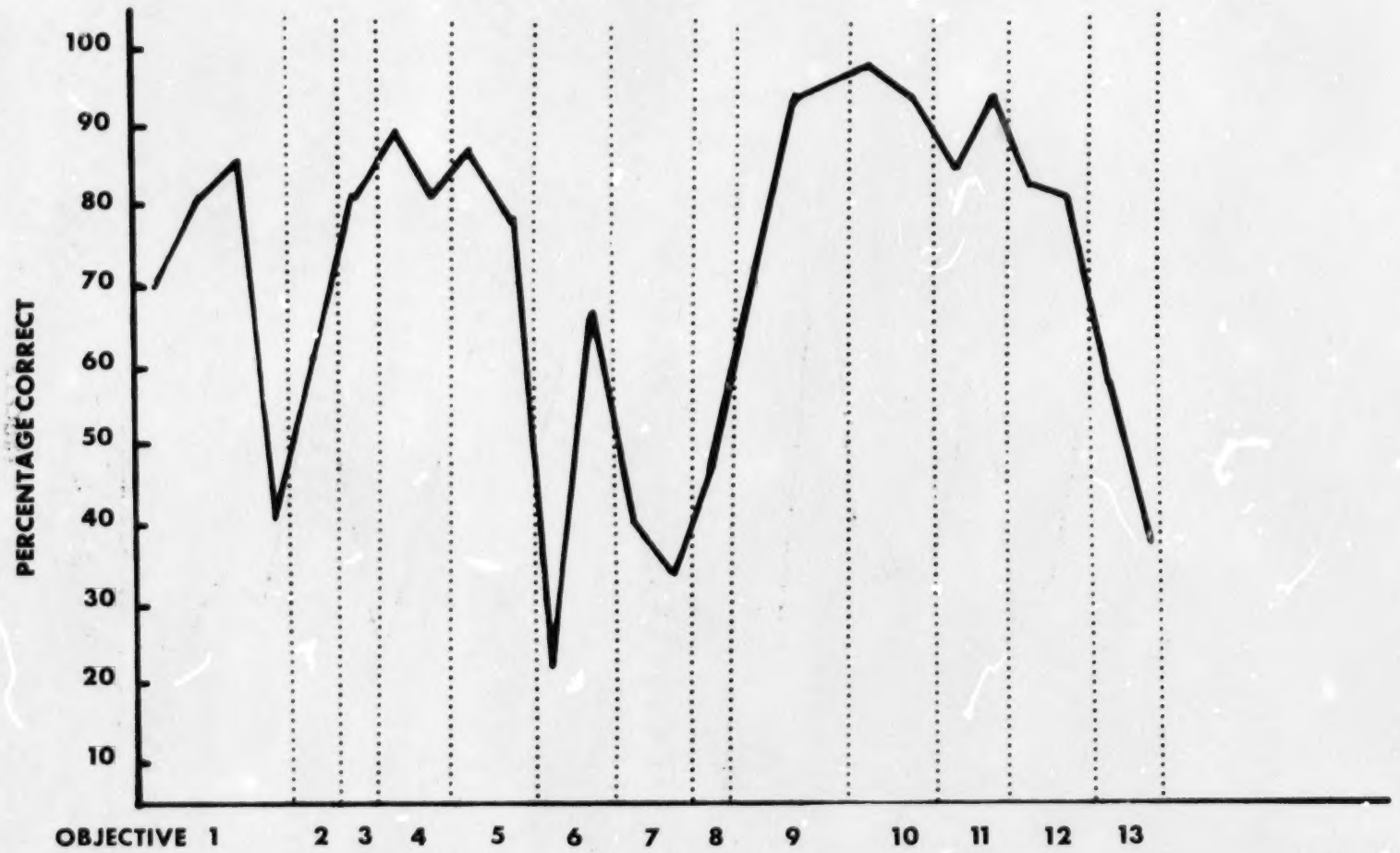
Percentage of Students Correctly Responding to Various Numbers of Items within Each Objective on Math Test (con't)

Objective	# Items Correct	State	Region			Race By Sex				Family Inc.			Parent's Ed.			
			C.P.	Pied.	Mtn.	BM	BF	WM	WF	H	M	L	1	2	3	4
23 Computation - addition of three and four addends with regrouping	= 0	15	19	14	10	27	24	12	7	2	14	25	28	20	12	6
	≥ 1	85	81	86	90	73	76	88	93	98	86	75	72	80	88	94
	= 2	46	42	46	56	26	31	50	60	70	48	26	33	37	51	58
24 Computation - subtraction of three and four addends with no regrouping	= 0	5	6	5	4	9	6	5	3	2	5	11	14	8	4	2
	≥ 1	95	94	95	96	91	94	95	97	98	95	89	86	92	96	98
	= 2	74	73	74	80	58	73	76	82	85	76	60	63	68	77	84
25 Computation - Subtraction of three and four addends with regrouping	= 0	35	42	33	28	48	45	32	28	17	35	47	43	43	32	25
	≥ 1	65	58	67	72	52	55	68	72	83	65	53	57	57	68	75
	= 2	30	24	32	37	14	22	33	38	50	31	17	23	20	32	44

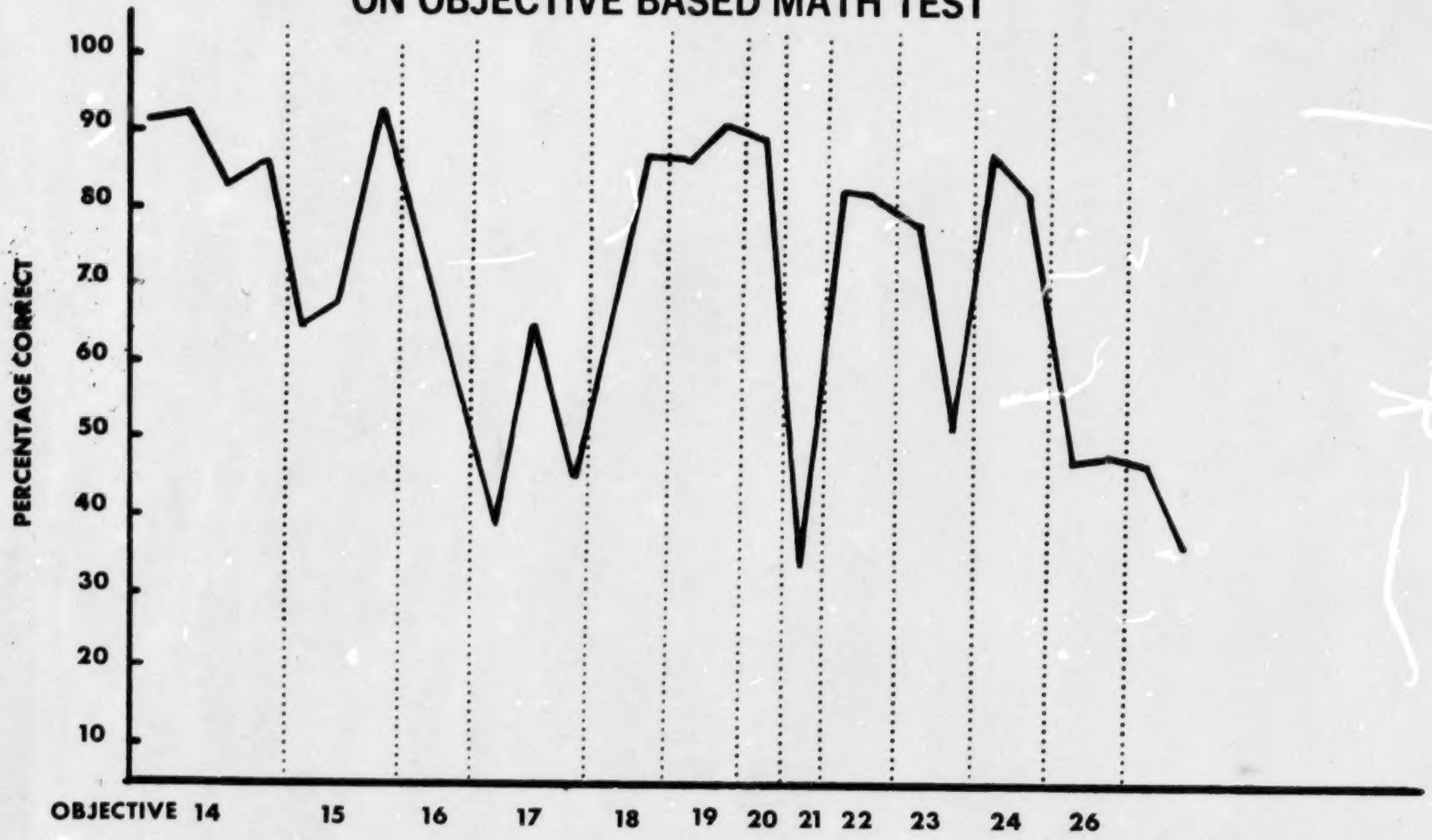
Percentage of Students Correctly Responding to Various Numbers of Items within Each Objective on Math Test (con't.)

Objective	# Items Correct	State	Region			Race By Sex				Family Inc.			Parent's Ed.			
			C.P.	Pied.	Mtn.	BM	BF	WM	WF	H	M	L	1	2	3	4
26 Computation - subtraction problem checked by addition.	= 0	41	48	40	33	57	49	36	33	18	40	56	63	52	38	21
	≥ 1	59	53	60	67	43	51	64	67	82	60	44	36	48	62	79
	= 2	25	21	26	29	14	16	27	34	52	26	10	12	16	26	44

PERCENT OF N. C STUDENTS RESPONDING CORRECTLY TO ITEMS ON OBJECTIVE BASED MATH TEST



PERCENT OF N. C STUDENTS RESPONDING CORRECTLY TO ITEMS ON OBJECTIVE BASED MATH TEST



NORTH CAROLINA AND NATIONAL DEMOGRAPHIC DATA

Variable (Year)	Source Code	North Carolina	U.S. (Average)	Rank
Estimated Population (1973)	1-3	5,273,000	209,851,000	12
Median Years of Schooling Completed by the Population 25 Years Old and Older (1970)	2	10.6	(12.1)	46
Median Family Income (1970)	2	$7,770	($9,867)	40
Percent of Population that is Black (1970)	2	22.2	(11.1)	6
Land Area (Square Miles)	2	48,798	3,536,855	29
Population Per Square Mile (1970)	2	104	(57)	17
Percent of Population Classified Rural (1970)	2	55.0	(26.5)	5
Median Age of Population (1970)	2	26.6	(28.3)	15
Per-Capita Personal Income (1972)	1-5	$3,799	($4,492)	34
Average Household Effective Buying Income (1972)	1-6	$7,441	($8,605)	39
Percent of Household with Cash Incomes Under $3,000 (1972)	1-6	19.4	(15.4)	12
Percent of Housing Lacking Some or All Plumbing Facilities (1970)	2	13.9	(5.5)	7
Percent of Housing with 1.01 or More Persons Per Room (1970)	2	10.0	(8.0)	13
Percent of Homes with Telephone Available (1970)	2	77.5	(87.3)	45
State and Local Tax Revenue Per $1,000 of Personal Income During 1971-72	3-1	$111.17	($126.94)	37
Percentage of Persons 25 Years and Over with Less Than 5 Years of School Completed (1970)	2	10.0	(5.5)	7
Percentage of Persons 25 Years and Over With 4 Years of High School or More (1970)	2	38.5	(52.3)	48
Per-Capita State and Local Tax Revenue During 1971-72	3-1	$376.58	($522.49)	43
Per-Capita Direct General Expenditures of State and Local Governments During 1971-72	3-1	$563.45	($801.38)	49

Variable (Year)	Source Code	North Carolina	U.S.(Average)	Rank
Amount of Expenditures for Local Schools by State and Local Governments per $1,000 of Personal Income During 1971-72	3-1	$44.98	($53.27)	46
State and Local Goverrment Expenditures for All Public Education As a Percent of Total General Expenditures in 1971-72	3-1	42.7	(38.9)	15
Per-Capita Total Expenditures of State and Local Governments for all Education During 1971-72	1-1	$240.41	($311.60)	45
Per-Capita State and Local Governmental Expenditures for Higher Education (includes community colleges) During 1971-72	1-1	$76.80	$76.57	26
Per-Capita State and Local Expenditures for Local (public) Schools (Including Capital Outlay) During 1971-72	1-1	$152.37	($219.27)	47
Revised Current Expenditure Per Pupil in Average Daily Membership: 1971-72	1-2	696	906	36
1972-73	1-2	765	968	37
(Estimate) 1973-74	1-2	846	1048	33

Source Code:
First Digit is Main Scource

1 = National Education Association Ranking of the States, 1974

2 = Bureau of the Census, County and City Data Book, 1972

3 = Tax Research Division, North Carolina Department of Revenue, "Ranking of North Carolina Among the 50 States With Respect to Revenues and Expenditures, March, 1974"

Second Digit is Primary Source

1 = Bureau of Census, Governmental Finances in 1971-72

2 = NEA, Estimates of School Statistics

3 = Bureau of Census, Estimates of the Population of the States

4 = Bureau of Census, General Social and Economic Characteristics

5 = "Survey of Current Business"

6 = "Sales Management"